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ABSTRACT

In order to meet the demand for Air Force Institute of Technology (AFIT) professional continuing education (PCE) courses within the School of Systems and Logistics and the School of Engineering, the Teleteach Expanded Delivery System (TEDS) for instruction of Air Force personnel at remote locations was developed and evaluated. TEDS uses a device which can transmit, via a dedicated telephone network, not only oral communications but also material written upon an electronic blackboard, which is regenerated at distant locations on a standard television monitor. TEDS was evaluated during the 1980 and 1981 fiscal years in comparison with resident instruction at Wright-Patterson Air Force Base (WPAFB). It was found that TEDS students achieved at least as well as students taught in residence; students accepted TEDS as a delivery method; acceptance of the TEDS schedule depended on the time zone in which instruction was received; and TEDS was cost effective in that, during its second year of operation, it provided instruction to 3.46 students at the cost of instruction for one resident student. The first and second operational year evaluation reports describe TEDS development, evaluation methods and results, TEDS sites, courses taught, and TEDS cost benefits. It is recommended that TEDS be expanded and that evaluation of its effect upon learning, acceptance, and cost be continued. (ESR)

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# TELETEACH EXPANDED DELIVERY SYSTEM

## EVALUATION

PROVIDED BY: THE AIR FORCE INSTITUTE OF TECHNOLOGY
Wright-Patterson AFB Ohio 45433

5 January 1981

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PART I

BACKGROUND

Requirement

The rapid growth of knowledge and the increasing complexity of technology offer a significant challenge to educational institutions. This challenge is especially evident within the Air Force Institute of Technology (AFIT). AFIT is responsible for providing undergraduate, graduate, and professional continuing education to the Air Force, and in certain content areas, the Department of Defense (DOD). AFIT accomplishes its mission objectives through resident instruction at Wright-Patterson AFB and through various types of nonresident instruction.

Resident professional continuing education (PCE) is designed to foster intense concentration in a subject area while minimizing the time students are absent from their duty stations. Course length ranges from three days to six weeks. Instruction occurs during a 6-7 hour class day, five days a week. Many blocks of instruction are presented by experts who are not assigned to the AFIT faculty. They teach as guest lecturers in courses designed and managed by the permanent faculty.

Nonresident PCE is provided through seminars, workshops, on-site offerings at the students' location, and correspondence courses. Approximately 10,000 students are instructed annually in these modes. More requests for resident and nonresident education exist than AFIT can accommodate.

In the specific area of professional continuing education (PCE), neither manpower nor facilities have kept pace with the need. In the 1978-79 academic year alone, over 7,000 students received professional continuing education in resident courses - less than 45% of the 15,000 who needed resident PCE that year.

Meeting the education demand poses a difficult problem. How can AFIT provide education to more students in existing courses and concurrently develop new courses without increasing the number of faculty, resident facilities, or TDY cost?

This problem is particularly evident in the School of Systems and Logistics. Numerous courses have 2-3 year student backlogs, while numerous requests are pending for new courses. Faculty are restricted in the amount of time available for course development due to heavy commitments in providing instruction in existing courses.

Limited physical facilities both within AFIT and at WPAFB, limited faculty, and limited budget preclude a solution based upon increased resident student attendance. Expansion of current modes of nonresident instruction is also limited since an increase would require additional faculty, increased travel, and increased support personnel.

Telephonic Delivery Systems

During the search for a resolution of this problem, use of the telephone as an educational delivery system was considered. Research into the educational viability of telephonic instruction revealed that over 37 telephone networks now convey instruction to civilian students who are remote from the point of origin. The most common network patterns are within specific states or within limited geographical areas. The acknowledged leader, the University of Wisconsin, serves over 35,000 students annually through its statewide telephonic network.

Telephonic networks currently provide information and courses to medical, legal, and agricultural professionals as well as students in agronomy, business, engineering, and mathematics. As yet, there is no indication that any content discipline is unsuitable for telephonic transmission. Some programs offer academic credit, other meet PCE requirements, while others carry no formal credit. Program length varies with the majority adhering to the normal higher education schedule, i.e., one to two hours a day, one to two days per week.

Research has shown consistently that learning is not significantly affected when telephonic instruction is compared to traditional classroom instruction. An excellent review of the literature is provided in Myrless Hershey's dissertation, A Comparison of the Effectiveness of Telephone Network and Face-to-Face Instruction for the Course "Creative Classroom," Kansas State University, Manhatten, Kansas, 1977.

Since 1973, both the School of Civil Engineering and the School of Systems and Logistics have routinely used commercial dial-up telephone services to provide limited length (1-2 hours) instruction to single remote locations. Teleteach or Telelecture was the name given to this delivery mode.

Recent technological advances in telecommunications now offer expanded capabilities. In early 1979 American Telephone and Telegraph began commercial marketing of a device which can transmit, through telephone lines, material written upon an electronic blackboard and regenerate the writing at distant locations on a standard TV monitor. The electronic blackboard offers a significantly expanded capability for the use of the telephone for educational purposes.

The success of telephonic networks in the civilian sector and AFIT's previous limited use of the medium strongly suggested that a dedicated telephonic-delivery system using the electronic blackboard might offer the solution to our need to educate more people without an increase in faculty, student facilities, or TDY funds.

The additional capabilities available in this Teleteach approach--the electronic blackboard, dedicated lines, and recording of classroom sessions, combined with AFIT's previous Teleteach/Telelecture delivery mode--suggested naming this delivery system the Teleteach Expanded Delivery System (TEDS).

Teleteach Expanded Delivery System

AFIT courses were identified within the School of Systems and Logistics where significant student backlogs existed. These courses are provided to meet the requirements of essentially two major Air Force commands, the Air Force Logistics

Command (AFLC) and the Air Force Systems Command (AFSC). Additionally, the majority of potential students are stationed at a limited number of bases.

Following an AFIT proposal, both commands agreed to establish a telephonic network with classrooms at specified bases. A preliminary cost analysis indicated that the cost of the delivery system would be offset if approximately 360 students received instruction without incurring travel and per diem expenses. Additionally, TEDS could provide a means of reducing the student backlog since instruction provided at AFIT to a regular class of 24 students could be received by approximately 120 additional students at AFLC sites and 96 additional students at AFSC sites. This could be accomplished without additional faculty.

Installation of two dedicated telephonic networks began in August 1979. One network connects AFIT with five Air Logistics Centers (ALCs) and a second network links AFIT with four AFSC locations. A map depicting network sites is provided at Attachment 1. Sites are geographically dispersed throughout the United States and encompass all time zones. Using two separate networks, two courses can be offered simultaneously: One for the AFLC sites, and one for the AFSC sites. Each course originates from a separate classroom at AFIT. The originating classrooms and each remote site classroom are connected through two pairs of dedicated telephone lines. One pair sends and receives verbal expressions, while the other pair transmits writing generated upon the electronic blackboard. Each site is able to transmit as well as receive. Therefore, presentations may originate from any site. Necessary visuals, in the 35mm slide format and/or in printed form are provided to each site. All verbal and blackboard written communication during each class is recorded on stereo-audio tape. Replay of classroom sessions is at the discretion of each remote site monitor.

Consideration of the time zone differences and normal student working hours resulted in an instructional schedule of daily four hour sessions from 1200 to 1600 EST. Presentations originating at AFIT were made before a student class at Wright-Patterson AFB Ohio. Ten-minute class breaks occurred each hour.

Several differences which exist between the AFIT TEDS and the situations previously described in the civilian education sector require identification.

The AFIT schedule (four hours per day, five days per week) offered a special challenge since, as mentioned previously, most studies of the effectiveness of telephonic delivery systems have been based upon a 1-2 hour exposure, 1-2 days a week. Second, most research has been conducted within a course structure using a small proportion of guest speakers. Three of the AFIT courses selected for inclusion in the experiment used a large number of guest speakers. The fourth course used only AFIT resident faculty. Third, two different presentation formats were used. Three courses used essentially the lecture format with opportunities for student questions/discussions, while the fourth course used the problem-solving format. Also, student group projects were components of two courses.

Other factors which may have significant influence upon the outcome of the experiment, but which are not thoroughly addressed in available research

studies are the effects of mandatory student attendance, lack of experience with the deivery system, and the time of day students receive instruction. There was only a minimum concern for bias due to novelty of the new system because courses provided by TEDS were at least 60 hours in length.

Implementation

Initial installation of communications equipment began in August 1979. Agreement was reached that an extensive evaluation would be conducted during the initial year of system operation. The School of Systems and Logistics (LS) identified four courses to be presented by TEDS which would be included in the evaluation. Each course selected had at least a two-year student backlog. A course completion certificate is available in each course and in three of the four courses, academic credit is also available. For purposes of clarity, these are referred to in the remainder of this report as certificated courses.

The School of Engineering also provided several mini-courses during a portion of the time when LS was not using TEDS. The engineering mini-courses ranged from one to ten hours in length and awarded no course completion certificate or credit. These courses are referred to in the remainder of the report as non-certificated courses and are separately treated from the certificated courses.

Use

All system scheduling was arranged through AFIT/ED so that accurate use data could be documented. Between operational acceptance, 10 October 1979, and the end of the experimental year, 30 September 1980, there were 3984 hours available (combined two networks) during normal eight-hour working days. AFIT (LS and EN) used the system a total of 1010 hours (25% of available) while AFLC and AFSC combined used 236 hours (8% of available). Cost related aspects of AFLC and AFSC use are summarized in Attachment 7. Specific AFIT use is presented in Attachment 8.

Evaluation

A comprehensive evaluation plan was developed and approved (August 1979) which focused upon three essential areas - - the system's effect upon student academic achievement, the degree of student acceptance of this mode of instructional delivery, and the cost/benefit relationship related to the delivery system and resident instruction. Four School of Systems and Logistics certificated courses provided the data upon which the evaluation was based. Data from all system use excluding the EN courses were used in the cost/benefit analysis. The EN non-certificated courses provided acceptance data only. System technical performance data were acquired from several sources including students, presenters, site monitors, and communications technicians.

## Research Questions

These seven research questions were examined in the evaluation:

1. Are student groups (control/experimental) comparable in terms of education level, grade/rank, age, and entry level knowledge?

2. What effect upon academic achievement did the TEDS have compared to resident and on-site delivery of the same courses?

3. What differences in academic achievement occurred between resident student groups receiving instruction face-to-face with the presenter and student groups receiving instruction without face-to-face presentations when both groups used the TEDS?

4. To what extent was the TEDS acceptable to students, their supervisors, presenters, visitors, and site monitors?

5. To what extent did students and their supervisors consider course value to be significantly different when resident, on-site, and TEDS instruction occurred?

6. To what extent did students and their supervisors consider the TEDS schedule acceptable?

7. How does the cost for TEDS compare to resident instruction on a per capita student basis?

Questions 1-4, and 7 are completely addressed in this report. Question 5 is not answered since data are still being collected through post course student and supervisor questionnaires administered six months after course completion. Question 6 is partially addressed in this report since supervisor assessment of the TEDS schedule is included in the post course supervisor questionnaire. Student response to the acceptability of the schedule is provided according

to the time zone when classes were received.

Separate reports addressing each course included in the experiment will be submitted as theses or technical reports.

## Experimental Design

The design of the experiment compared resident WPAFB instruction (NONTEDS) to TEDS instruction when a course was given in both modes. Resident WPAFB instruction (NONTEDS) was compared to the TEDS resident group when a course was given in both modes. Resident TEDS instruction was compared to remote TEDS when TEDS was used. Comparison was also made between two offerings of the same course by TEDS. Two on-site course offerings (Hanscom, Mass., and Hawaii) were compared to TEDS presentation of the same course and the on-site data were compared with the resident TEDS group.

## Statistical Analysis

The demographic, end-of-course critique items, and content exam data were collected on standard computer answer sheets, cards were punched and these were then batch loaded into the computer. The Statistical Package for the Social Sciences (SPSS) was then used to generate the statistical analyses. A subprogram generated crosstabulation tables representing tests of statistical significance (chi square) for demographic data and end-of-course critique items. The computer printouts displayed the variables by site locations and by method of delivery. Another subprogram calculated and printed the sums, means, standard deviations and variances. The variables analyzed were pretest and post-test scores, achievement, and student acceptance of TEDS. These variables were compared by location and by method of delivery and a one-way analysis of variance was computed to determine statistical significance. A subprogram of SPSS was employed to examine the relationship between the dependent and the independent variables.

To insure that groups were comparable, when significant group differences on the demographic factors of age, education level, grade/rank, or years of experience were found, each was examined for its influence upon the dependent variables.

Groups were then defined in terms of method of delivery. Dependent variables of post-test grade and the difference of post-test minus pretest grades (termed achievement) were tested for group differences defined in terms of the independent variable TEDS vs NONTEDS. The same dependent variables were tested separately with the independent variable pairs - Resident TEDS vs NONTEDS, On-site vs TEDS, on-site vs Resident TEDS, and Resident TEDS vs Remote TEDS.

Additionally, the dependent variable, acceptance, was tested for group differences defined in terms of the independent variable, Resident TEDS vs Remote TEDS.

The significance criterion was set at .05.

Other data acquired from presenters and site monitor critiques, visitor comments and oral reactions to the TEDS were recorded, tabulated, and reported using simple percentage comparisons.

The findings for each area are addressed separately in the following report. The final section, Part III, provides a summary including discussion, conclusions and recommendations.

PART II

RESULTS

Learning

These research questions posed in the evaluation plan were addressed relative to the effect of TEDS upon learning:

1. Are student groups (control/experimental) comparable in terms of education level, grade/rank, age, and entry level knowledge?

2. What effect upon academic achievement did the TEDS have compared to resident and on-site delivery of the same courses?

3. What differences in academic achievement occurred between resident student groups receiving instruction face-to-face with the presenter and student groups receiving instruction without face-to-face presentations when both groups used the TEDS?

A. Certificated Courses

1. The effect upon learning of the Teleteach Expanded Delivery System was determined in this way:

a. Pretest and Post-test data were acquired from students who took the same course given in the resident mode (NONTEDS) and the TEDS mode. These data were identified and analyzed by separate site and were combined to form comparison groups.

b. When no resident (NONTEDS) course was available against which TEDS comparison could be made, only the TEDS individual sites were compared.

2. Two categories of data provided the basis upon which the effect of TEDS on learning was determined. First, demographic data, including age, rank/grade, years of experience related to the course, and academic level of accomplishment were collected. Second, entry level knowledge was acquired through the administration of a pretest. Tests administered during each course were combined to constitute a post-test.

Analyses were performed so that comparability of groups could be determined based upon demographic data. If a factor(s) significant at the .05 level were revealed, it was examined statistically against academic performance to determine if it played a significant role in academic achievement.

3. Results:

a. NONTEDS vs TEDS. During the experiment, there were five instances when a comparison could be made between NONTEDS and TEDS. In all five instances no significant difference in learning was found.

b. NONTEDS vs Resident TEDS. There were also five instances where the NONTEDS group could be compared to the resident TEDS group. No significant differences of learning were observed.

c. Resident TEDS vs Remote TEDS. There were seven instances where the resident TEDS group could be compared to the remote TEDS group. No significant differences were observed in six instances. In one instance, the resident TEDS group performed significantly better than the remote group.

d. On-site vs TEDS. One course was provided in the on-site mode on two occasions. Results were compared to the TEDS offering of the same course. No statistical significant difference in achievement was found between the on-site and TEDS students.

e. On-Site vs Resident TEDS. The on-site group was also compared to the resident group since both were face-to-face with the presenter. No statistical significant difference in achievement was found.

Although certain demographic factors were found to be significantly different between comparison groups, none were found to account for differences in achievement. Individual course achievement results are shown in attachment 2.

B. Non-Certificated Courses

No attempt was made to measure learning for these courses since they were not offered for credit nor certification, hence no content examinations were given.

Acceptance

This research question posed in the evaluation plan was examined to determine system acceptance:

"To what extent was the TEDS acceptance to students, their supervisors, presenters, visitors, and site monitors?"

Student and presenter (instructor) acceptance data were collected and analyzed statistically. Data from supervisors is still being collected. Visitors and site monitors reactions to the system were in the form of written comments.

A. Certificated Courses - Student

1. An end-of-course critique provided acceptance data. Responses to these two statements were combined to provide an "acceptance" score:

a. The Teleteach Delivery System is an acceptable learning medium. (#23 on End-of-Course Critique.)

b. I would take another course which used this delivery system. (#25 on End-of-Course Critique.)

Five response options were available:

A. Strongly agree

B. Agree

C Neither agree nor disagree

D. Disagree

E. Strongly disagree

Options A and B were combined to indicate TEDS acceptance while options D and E were combined to indicate TEDS rejection.

2. Results:

Data were kept separately by TEDS site and combined for an overall TEDS assessment. A total of 36 individual site observations were made which revealed 56% acceptance and 27% rejection. Sites ranged from 93% acceptance to 75% rejection.

Individual site acceptance scores by course are provided at Attachment 3.

B. Non-Certificated Courses - Student

1. Students in the non-certificated courses were asked to respond to these two statements:

1. I would take another mini-course via Teleteach. (#2 on End-of-Course Critique)

2. I will encourage others to take this mini-course. (#6 on End-of-Course Critique.)

Both statements offered five response options:

A. Strongly agree

B. Agree

C. Neither agree nor disagree

D. Disagree

E. Strongly disagree

Options A and B were combined to indicate TEDS acceptance while options D and E were combined to indicate TEDS rejection.

2. Results:

Data were categorized by local (face-to-face) and remote (not face-to-face). Local students accepted TEDS at the 85% level while rejection was at the 3% level. Remote students accepted the TEDS at an 82.7% level while rejecting it at a 2.75% level. Overall acceptance was 83.85% while overall rejection was 2.87%.

Presenters

The research question addressed in part in this data analysis was: "To what extent was TEDS acceptable to students, their supervisors, presenters, visitors and site monitors." The data on presenter acceptance were provided by the "Instructor

Critique of Teleteach Expanded Delivery System" responses to two questions. The questions were: "I would like to teach again using the Teleteach system" and, "After using the Teleteach system I feel more favorable towards its use." The response options were:

A. Strongly agree

B. Agree

C. Neither agree nor disagree

D. Disagree

E. Strongly disagree

The A and B responses were combined to reflect acceptance and the D and E responses were combined to reflect rejection. Responses to the two questions were combined to provide the acceptance measure. Of the 123 responses from presenters, 57 percent agreed that after using the system they were both more favorable towards its use and would like to use it again; 21 percent remained neutral; while 22 percent were unfavorable.

## Visitors and Site Monitors

Visitors were asked to complete a brief questionnaire following their attendance at a TEDS site. This open-ended question was used to ascertain their acceptance or rejection of the system: "What were your overall reactions to the Teleteach program?". Results indicated an 82.7 percent favorable reaction and a 17.2 percent unfavorable reaction.

Site monitors were not formally asked their opinion of the system. Informal verbal comments were more favorable than unfavorable.

## Schedule

TEDS students were asked (Question 17, end-of-course critique) to respond to this statement: "I liked the hours the course was offered." Five response options, identical to those previously indicated were available. Responses A and B were combined to indicate a positive response to the schedule while D and E responses were combined to indicate unfavorable response. Results revealed that in no time zone were students favorable to the schedule. The data are provided in Attachment 9.

### System Performance

The Teleteach Expanded Delivery System involves not only the components necessary for transmission but includes also the adequacy of site classrooms and classroom supervision. Data sources which provided information about these aspects included student written comments, site monitor written and verbal comments, course director notes, and a communications log book.

## Technical

The technical aspect of the delivery system includes audio and graphics telephonic transmission and associated equipment which was leased (communications) and purchased (audio visual).

Data revealed some transmission malfunctions and the lack of some required audio visual equipment at several sites during the experimental period. Transmission difficulties were usually remedied within two hours yet on a few occasions several days were required to diagnose and remedy the problem. In some instances a transmission problem (FM radio station, pilot to ground communication, equipment hum) caused at one remote site was transmitted to all sites since they shared a common teleconferencing system. Whenever a dedicated telephone line itself caused a problem, a back-up commercial line was employed.

Such technical difficulties were encountered infrequently, but the disruptions to the instructional presentations cannot be overlooked.

Each participating command was asked to provide these audio visual items within each TEDS classroom:

a. 2 TV monitors (25")
b. 1 stereotape recorder
c. 8 student push-to-talk microphones
d. 2 student microphone mixers

Some remote classrooms did not have all their equipment during the experimental period. Several sites were without student microphones. Some sites had only one TV monitor which made it difficult for students to read the material presented on the electronic blackboard.

## Remote classroom and supervision adequacy

Classroom facilities and supervisor responsibilities were defined prior to the start of TEDS; however, some sites had inadequate classrooms in terms of size, environmental controls, and location.

Supervision (site monitors) was provided at each site by individuals who assumed the TEDS workload in addition to their normal duties. This situation resulted in the lack of daily supervision at some sites.

As deficiencies were noted, actions were taken to remedy them. However, in several instances entire course offerings occurred without student microphones being available.

## Cost/Benefits

This research question guided the collection and analysis of cost related data:

"How does the cost for TEDS compare to resident instruction on a per capita student basis?"

## A. Costs

Costs for the Teleteach Expanded Delivery System included expenditures for equipment installation and purchase, and annual communications lease charges. Installation charges for communication related equipment totalled $23,730. Equipment purchase costs were $25,960. Annual communication lease cost (Oct 79-Oct 80) was $212,419 while $10,312 lease cost occurred during Aug-Sep 79. Hence the total lease cost for 14 months was $222,731.

## B. Benefits

If the remote students who completed the certificated courses had been brought to WPAFB for resident instruction, the travel and per diem cost would have been $533,910. In one course AFIT faculty had to travel to the remote sites to conduct a simulation exercise. When those costs are deducted from the avoided student travel/per diem costs, a total of $523,702 in cost avoidance is realized.

System availability permitted the using commands (AFLC and AFSC) to conduct briefings, conferences, and training sessions. Data acquired from those users revealed a cost benefit of $272,127.

## C. Cost vs Benefit

In summary, the cost for the system from August 1979 through 1 October 1980 was $272,690. The cost benefit realized from October 1979 through 1 October 1980 was $795,829. The difference between system cost and system benefit was therefore $523,139 in favor of the Teleteach Expanded Delivery System. These data reveal that the cost of TEDS instruction is approximately 1/2 of the cost for resident instruction. Specific details of system cost are provided at Attachment 4 while system cost benefits are shown in Attachment 5. Attachment 6 provides course descriptions and associated cost factors. Attachment 7 provides the cost analysis summary.

# Part III

# SUMMARY

## Discussion

In only one instance was there a statistical significant difference in academic achievement even though some negative expressions by students and presenters were recorded in the areas of classroom supervision and equipment, transmission, supervisor expectations, courses, and schedules. The influence of these factors upon academic achievement and system acceptance is difficult to relate specifically. One might assume, however, that if these negative factors were eliminated an increase in achievement and acceptance might occur.

The wealth of information obtained from this study can provide the basis upon which future system use can be improved. It should be remembered that the system was experimental in every sense. The test period furnished valuable

cost comparison data. It also furnished valuable data on methodology. The lessons learned will provide a sound basis for overall improvement in delivery techniques, efficient system utilization, and improved acceptance.

Conclusions

The evaluation results indicate that learning is not significantly different when the Teleteach Expanded Delivery System is used compared to resident instruction. Students generally accept the system and considerable cost benefits accrue when the TEDS is used in lieu of resident instruction.

Recommendations

1. The Teleteach Expanded Delivery System should be continued because student backlogs still exist, scientific and technical people need increased professional continuing education, learning gains are not significantly different, and the system is cost effective.

2. Other applications need to be identified where similar benefits would most likely occur.

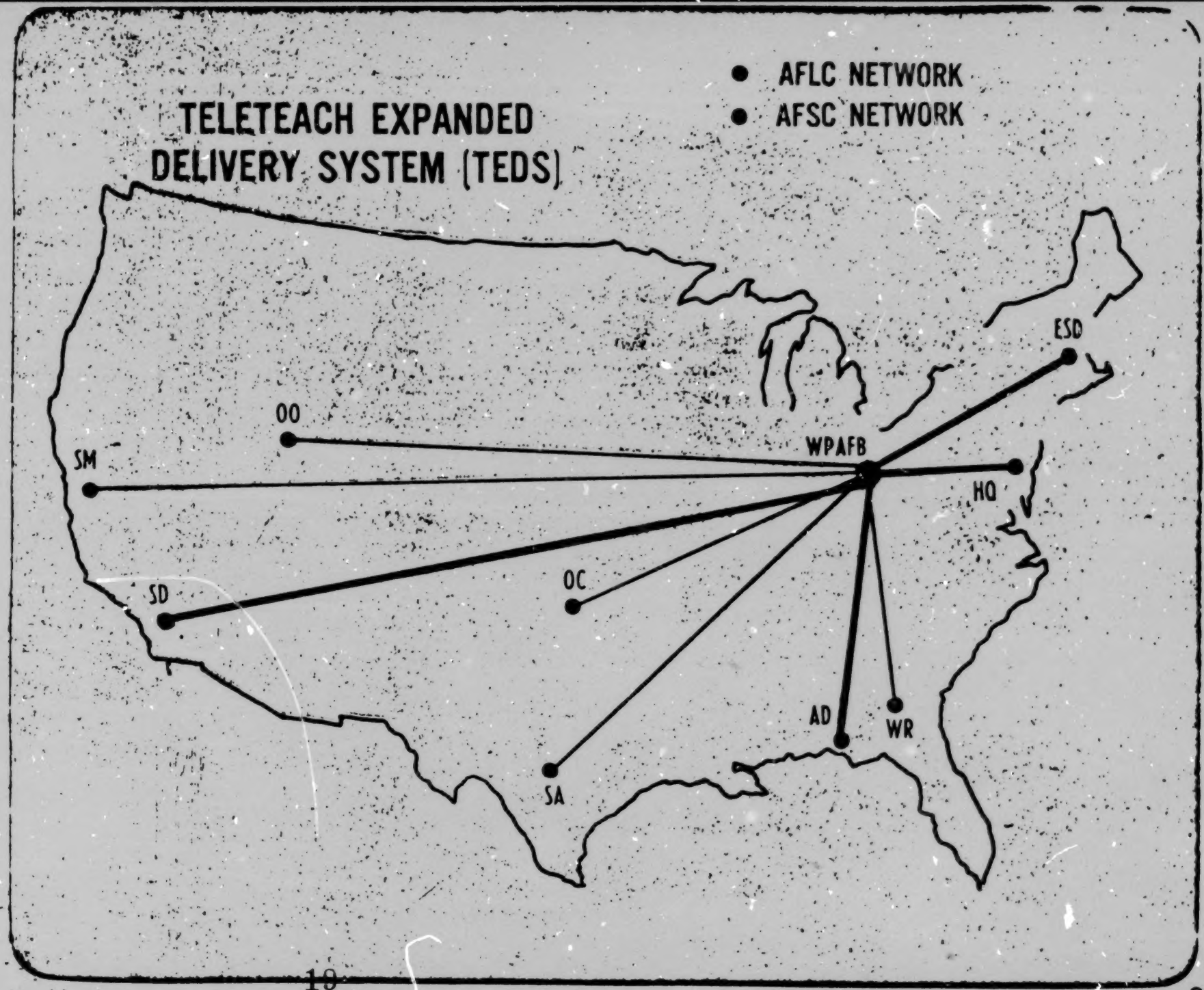
3. Negative aspects found during the study need to be rectified so that maximum achievement and system acceptance can be obtained.

4. "Additional duty" assignments must become "primary" assignments as the system moves from "experimental" to "standard."

5. System expansion should be considered if there is an educational need at sites which are not currently on the system.

These recommendations require commitments of money, manpower, and equipment. The evaluation results support such commitment.

11 Atch
1. TEDS Sites
2. Achievement Scores
3. Acceptance Scores
4. System Costs
5. System Cost Benefits
6. Individual Course Descriptions and Associated Cost Factors
7. Cost Analysis Summary
8. System Use, Students Involved, Course Certification, and Site Participation
9. Student Schedule Acceptance
10. Visitation Summary
11. Interaction Summary


TELETEACH EXPANDED
DELIVERY SYSTEM (TEDS)
AFLC NETWORK
AFSC NETWORK
ESD
OO
WPAFB
SM
HQ
SD
OC
AD
WR
SA

TELETEACH EXPANDED DELIVERY SYSTEM

FY 80

ACHIEVEMENT SCORES



atch 2

| METHODOLOGY | ACHIEVEMENT | |
|---|---|---|
| | NO SIGNIFICANT* DIFFERENCE | SIGNIFICANT DIFFERENCE |
| NONTEDS vs TEDS | 5 | 0 |
| NONTEDS vs RESIDENT TEDS | 5 | 0 |
| RESIDENT TEDS vs REMOTE TEDS | 6 | 1 (R) |
| ON SITE vs TEDS | 1 | 0 |
| ON SITE vs RESIDENT TEDS | 1 | 0 |

*p = .05

INCLUDES RESULTS FROM 7 TEDS USES

COURSES

LOG 220 (2 TEDS Offerings, 2 Resident Offerings)

SYS 123 (2 TEDS Offerings)

QMT 170 (1 TEDS Offering, 4 Resident Offerings combined and 2 On Site Offerings combined)

SYS 223 (2 TEDS Offerings, 1 Resident Offering)

ACHIEVEMENT BY SITE/COURSE

ACHIEVEMENT IS POST TEST SCORE MINUS PRETEST SCORE MEAN EXPRESSED IN PERCENTAGE

| SITE | LOG 220R (Jul) | LOG 220T (Oct) | LOG 220R (Jan) | LOG 220T (Mar) | QMT 170R (4 Comb) | QMT 170T (Feb) | QMT 170S (2 Comb) | SYS 123T (Oct) | SYS 123T (Jan) | SYS 223R (Mar) | SYS 223T (Apr) | SYS 223 (Jun) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WP | 32.2 | 18.6 | 27.8 | 22.4 | 52.7 | 55 | | 42.8 | 39.8 | 35 | 36.5 | 42 |
| OO | | 25 | | 19.3 | | 49 | | | | | | |
| OC | | 22 | | 18.6 | | -- | | | | | | |
| SA | | 18.5 | | 19.7 | | 52 | | | | | | |
| SM | | 15.6 | | 28.7 | | 45.8 | | | | | | |
| WR | | 11.9 | | 16.8 | | 46.5 | | | | | | |
| ESD | | | | | | 52 | | 29.1 | 38.7 | | 33.3 | 29.9 |
| AD | | | | | | | | 28.6 | 37.5 | | 35.4 | 39 |
| SD | | | | | | | | 27.8 | 43.1 | | 45.9 | 43 |
| HQS | | | | | | | | | 44.4 | | 24.6 | 32.6 |
| ON-SITE | | | | | | | 53.9 | | | | | |

ACHIEVEMENT AS PERCENT GAIN OF AVAILABLE

| SITE | LOG 220R (Jul) | LOG 220T (Oct) | LOG 220R (Jan) | LOG 220T (Mar) | QMT 170R (4 Comb) | QMT 170T (Feb) | QMT 170S (2 Comb) | SYS 123T (Oct) | SYS 123T (Jan) | SYS 223R (Mar) | SYS 223T (Apr) | SYS 223T (Jun) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| WP | 66 | 52.4 | 57 | 55.4 | 76.6 | 70.8 | | 53.8 | 52.8 | 57 | 57 | 60.9 |
| OO | | 58 | | 47.7 | | 68.9 | | | | | | |
| OC | | 55 | | 49.3 | | -- | | | | | | |
| SA | | 44.7 | | 47.7 | | 68.7 | | | | | | |
| SM | | 43.3 | | 60.9 | | 70.2 | | | | | | |
| WR | | 36.9 | | 41.1 | | 67.7 | | | | | | |
| ESD | | | | | | 75.7 | | 36.1 | 50.3 | | 59 | 47 |
| AD | | | | | | | | 42.2 | 47.1 | | 56 | 63.8 |
| SD | | | | | | | | 42.6 | 54.4 | | 62 | 62 |
| HQS | | | | | | | | -- | 54.1 | | 44 | 50 |
| ON-SITE | | | | | | | 74.5 | | | | | |

LOG 220

TELETEACH

| | Mean Pre % | % Gain Avail | Mean Post % | % Mean Gain | % Gain of Avail |
|---|---|---|---|---|---|
| WP | 64.5 | 35.5 | 83.2 | 18.6 | 52.4 |
| OO | 56.9 | 43.1 | 85.3 | 25 | 58 |
| OC | 60 | 40 | 82 | 22 | 55 |
| SA | 58.6 | 41.4 | 81.5 | 18.5 | 44.7 |
| SM | 64 | 36 | 80.4 | 15.6 | 43.3 |
| WR | 67.3 | 32.7 | 79.4 | 11.9 | 36.9 |

RESIDENT

(July 79)

| | | | | | |
|---|---|---|---|---|---|
| WP | 51.2 | 48.8 | 84 | 32.2 | 66 |

LOG 220 TELETEACH (Mar 80)

| | | | | | |
|---|---|---|---|---|---|
| WP | 59.6 | 40.4 | 82 | 22.4 | 55.4 |
| OO | 59.6 | 40.4 | 78.9 | 19.3 | 47.7 |
| OC | 62.3 | 37.7 | 80.9 | 18.6 | 49.3 |
| SA | 58.7 | 41.3 | 78.4 | 19.7 | 47.7 |
| SM | 52.9 | 47.1 | 81.6 | 28.7 | 60.9 |
| WR | 59.1 | 40.9 | 75.9 | 16.8 | 41.1 |

RESIDENT

(Jan 80)

| | | | | | |
|---|---|---|---|---|---|
| WP | 51.3 | 48.7 | 79.1 | 27.8 | 57 |

QMT 170

| | Mean Pre % | % Gain Avail | Mean Post % | Mean % Gain | % Gain of Avail |
|---|---|---|---|---|---|
| **4 NONTEDS RESIDENT** | | | | | |
| WP | 31.2 | 68.8 | 83.9 | 52.7 | 76.6 |
| **TELETEACH** | | | | | |
| WP | 22 | 78 | 77.2 | 55.2 | 70.8 |
| OO | 27.7 | 72.3 | 77.5 | 49.8 | 68.9 |
| SA | 24.3 | 75.7 | 76.3 | 52 | 68.7 |
| SM | 34.8 | 65.2 | 80.6 | 45.8 | 70.2 |
| WR | 31.3 | 68.7 | 77.8 | 46.5 | 67.7 |
| ESD | 31.3 | 68.7 | 83.3 | 52 | 75.7 |
| **ON-SITE** | | | | | |
| Hanscom | 29.3 | 70.7 | 81.5 | 52.7 | 74.5 |
| Hawaii | 26.1 | 73.9 | 81.2 | 55.1 | 74.6 |
| **ON-SITE** | | | | | |
| **2 Offerings** | | | | | |
| Combined | 27.7 | 72.3 | 81.3 | 53.9 | 74.5 |

SYS 123

TELETEACH

(Oct 79)

| | Mean Pre % | % Gain Avail | Mean Post % | % Mean Gain | % Gain of Avail |
|---|---|---|---|---|---|
| WP | 20.4 | 79.6 | 63.2 | 42.8 | 53.8 |
| AD | 32.3 | 67.7 | 60.8 | 28.6 | 42.2 |
| SD | 34.8 | 65.2 | 63.3 | 27.8 | 42.6 |
| ESD | 19.5 | 80.5 | 49.7 | 29.1 | 36.1 |
| HQ | - | - | - | - | - |

TELETEACH

(Jan 80)

| | | | | | |
|---|---|---|---|---|---|
| WP | 24.6 | 75.4 | 64.4 | 39.8 | 52.8 |
| AD | 20.4 | 79.6 | 57.9 | 37.5 | 47.1 |
| SD | 20.8 | 79.2 | 63.9 | 43.1 | 54.4 |
| ESD | 23 | 77 | 61.8 | 38.7 | 50.3 |
| HQ | 17.9 | 82.1 | 61 | 44.4 | 54.1 |

SYS 223

TELETEACH

(April)

| | Mean Pre % | % Gain Avail | Mean Post % | Mean % Gain | % Gain of Avail |
|---|---|---|---|---|---|
| WP | 36.17 | 63.83 | 72.67 | 36.5 | 57 |
| SD | 26.53 | 73.47 | 72.39 | 45.9 | 62 |
| AD | 36.37 | 63.63 | 71.80 | 35.4 | 56 |
| ESD | 43.38 | 56.62 | 76.65 | 33.3 | 59 |
| HQ | 44.58 | 55.42 | 69.16 | 24.6 | 44 |

RESIDENT

(March)

| | | | | | |
|---|---|---|---|---|---|
| WP | 38.44 | 61.56 | 73.45 | 35 | 57 |

TELETEACH

(June)

| | | | | | |
|---|---|---|---|---|---|
| WP | 31.04 | 68.96 | 73.09 | 42 | 60.9 |
| SD | 31.02 | 68.98 | 74 | 43 | 62 |
| AD | 38.07 | 61.93 | 77.6 | 39 | 63.8 |
| ESD | 36.52 | 63.48 | 66.42 | 29.9 | 47 |
| HQ | 34.98 | 65.02 | 67.54 | 32.6 | 50 |

TELETEACH EXPANDED DELIVERY SYSTEM

FY 80

ACCEPTANCE SCORES



atch 3

LS STUDENT

ACCEPTANCE BY PERCENTAGE BY COURSE

| SITE | LOG 220T (OCT) | | LOG 220T (MAR) | | QMT 170T (JAN) | | SYS 123T (OCT) | | SYS 123T (JAN) | | SYS 223T (APR) | | SYS 223T (JUN) | | SITE TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | R | A | R | A | R | A | R | A | R | A | R | A | R | TIMES MEASURED | AVERAGE A% | R |
| WP | 68 | 12 | 26 | 28 | 68 | 5 | 86 | 5 | 70 | 10 | 27 | 50 | 73 | 3 | 7 | 60 | 16 |
| OO | 79 | 4 | 45 | 32 | 79 | 9 | | | | | | | | | 3 | 68 | 15 |
| OC | 46 | 27 | 32 | 55 | - | - | | | | | | | | | 2 | 39 | 41 |
| SA | 81 | 15 | 79 | 9 | 69 | 19 | | | | | | | | | 3 | 76 | 14 |
| SM | 88 | 8 | 93 | 0 | 63 | 14 | | | | | | | | | 3 | 81 | 7 |
| WR | 46 | 33 | 52 | 32 | 24 | 57 | | | | | | | | | 3 | 41 | 41 |
| ESD | | | | | 40 | 44 | 16 | 49 | 34 | 40 | 34 | 53 | 68 | 21 | 5 | 50 | 41 |
| AD | | | | | | | 24 | 59 | 16 | 61 | - | - | 42 | 14 | 3 | 35 | 45 |
| SD | | | | | | | 69 | 12 | 47 | 29 | 75 | 18 | 70 | 20 | 4 | 65 | 20 |
| HQ | | | | | | | - | - | 85 | 8 | 50 | 10 | 0 | 75 | 3 | 45 | 31 |

A = Accept

R = Reject

STUDENT

ACCEPTANCE EN MINI COURSE PROGRAM

| NUMBER OF COURSES | MONTH PROVIDED | NUMBER OF STUDENTS | ANOTHER COURSE | | ENCOURAGE OTHERS | | AVERAGE | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | A% | R% | A% | R% | A% | R% | |
| 8 | Oct 79 | LOCAL 113 | 90 | 1 | 80 | 5 | 85 | 3 | LOCAL |
| | | REMOTE 199 | 89 | 2 | 79 | 3 | 84 | 2.5 | REMOTE |
| | | TOTAL 312 | - | - | - | - | 84.5 | 2.7 | TOTAL |
| 4 | NOV/DEC 79 | LOCAL 120 | - | - | - | - | - | - | LOCAL |
| | | REMOTE 204 | 90 | 0 | 73 | 6 | 81.5 | 3 | REMOTE |

| OVERALL AVERAGE | A% | R% |
|---|---|---|
| LOCAL | 85 | 3 |
| REMOTE | 82.7 | 2.75 |
| TOTAL | 83.85 | 2.87 |

A = Accept
R = Reject

PRESENTER (INSTRUCTOR) ACCEPTANCE

| | QUESTIONS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | WOULD USE TEDS AGAIN | | | | MORE FAVORABLE AFTER USE | | | |
| n = 123 | A | N | R | | | A | N | R |
| RAW SCORE | 79 | 19 | 25 | | | 62 | 32 | 29 |
| % | 64 | 15 | 20 | | | 50 | 26 | 24 |

QUESTIONS COMBINED

| n = 246 | A | N | R |
|---|---|---|---|
| RAW SCORE | 141 | 51 | 54 |
| % | 57 | 21 | 22 |

TELETEACH EXPANDED DELIVERY SYSTEM

FY 80

SYSTEM COSTS



atch.

1. Total system costs from August 1979 through 1 October 1980 were $272,421.

2. Costs were incurred in two categories, nonrecurring and recurring.

| Nonrecurring (FY 79) | | Annual Recurring | |
|---|---|---|---|
| Communications | $23,730 | Communications (FY 79) | $10,312 |
| Govt Purchased Equipment | $25,960 | Communications (FY 80) | $212,419.08 |

3. Specific nonrecurring costs were:

Communication

| Item | Quantity | Unit Cost | Site Cost | # Sites | Total |
|---|---|---|---|---|---|
| Telephone Circuits | 2 | $109 | $218 | 9 | $1,062 |
| Electronic Blackboard | 1 | 633 | 633 | 10 | 6,330 |
| Telephone Bridge | 1 (AFIT Only) | 13,048 | 13,048 | 1 | 13,048 |
| | | | Eglin AFB | 1 | 2,400 |
| | | | | Total | $23,730 |

Government Equipment

| Item | Quantity | Unit Cost | Site Cost | # Sites | Total |
|---|---|---|---|---|---|
| Stereotape Recorder | 1 | $250 | $250 | 11 | $2,750 |
| Television Monitor (25") | 2 | 700 | 1,400 | 11 | 15,400 |
| Student Microphones | 8 | 54 | 432 | 11 | 4,752 |
| Microphone Mixer | 2 | 139 | 278 | 11 | 3,058 |
| | | Site Cost | $2,360 | System Cost | $25,960 |

4. Specific annual recurring costs were:

a. FY 79

## FY1979 TEDS CHARGES

| | AFIT EQPT | AFIT CIRCUITS | AFLC | AFSC | TOTALS |
|---|---|---|---|---|---|
| | 14,316.07 | 1,978.56 | | (Eglin - 2,437) | |
| INSTALLATION | 16,294.63 | | 3,029.36 | 4,478.11 | 23,802.10 |
| | 691.01 | 7,201.41 | | | |
| AUG LEASE | 7,892.42 | | 1,123.40 | 661.81 | 9,677.63 |
| | 1,295.65 | 12,872.02 | | | |
| SEP LEASE | 14,167.67 | | 2,232.39 | 1,764.07 | 18,164.13 |
| | 16,302.73 | 22,051.99 | | | |
| TOTALS | 38,354.72 | | 6,385.15 | 6,903.99 | 51,643.86 |

FY79 TEDS DEDUCTION BY ATC = $30,000

b. FY 80

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR TRAINING COMMAND
RANDOLPH AIR FORCE BASE, TX 78148

REPLY TO ATTN OF: DCO (Wolfe/4531)

SUBJECT: Teleteach

TO: ATC/ACB

Breakdown of Teleteach charges is submitted for your information per Mr Viego's request:

| | | | |
|---|---|---|---|
| a. | Hill AFB | | |
| | (1) Voice ckt | (87809) | 917.77 |
| | (2) Data ckt | (87810) | 917.77 |
| | (3) Equipment | (MSOCY48027) | 485.22 |
| b. | Wright-Patterson | | |
| | Equipment | | 1295.65 |
| c. | Tinker AFB | | |
| | (1) Voice ckt | (87813) | 530.11 |
| | (2) Data ckt | (87814) | 530.11 |
| | (3) Equipment | (SWOCY48053) | 441.88 |
| d. | McClellan AFB | | |
| | (1) Voice ckt | (87811) | 1259.00 |
| | (2) Data ckt | (87812) | 1259.00 |
| | (3) Equipment | (PTOCY48016) | 419.20 |
| e. | Kelly AFB | | |
| | (1) Voice ckt | (87817) | 698.36 |
| | (2) Data ckt | (87818) | 698.36 |
| | (3) Equipment | (SWOCY48054) | 436.70 |

| | | | |
|---|---|---|---|
| f. | Robins AFB | | |
| | (1) Voice ckt | (87815) | 368.12 |
| | (2) Data ckt | (87816) | 368.12 |
| | (3) Equipment | (SBOCY 48019) | 449.39 |
| g. | Andrews AFB | | |
| | (1) Voice ckt | (87823) | 311.85 |
| | (2) Data ckt | (87824) | 311.85 |
| | (3) Equipment | (CPVOCY 48003) | 432.28 |
| h. | Hanscom Field | | |
| | (1) Voice ckt | (87819) | 485.21 |
| | (2) Data ckt | (87820) | 485.21 |
| | (3) Equipment | (HE OCY 48014) | 483.75 |
| i. | Los Angeles AFS | | |
| | (1) Voice ckt | (87821) | 1176.96 |
| | (2) Data ckt | (87822) | 1176.96 |
| | (3) Equipment | (PT OCY 480717) | 419.20 |
| j. | Eglin AFB | | |
| | (1) Voice ckt | (87825) | 457.36 |
| | (2) Data ckt | (87826) | 457.36 |
| | (3) Equipment | (SETT OCY 48003) | 428.84 |
| | Total Monthly Rental | | $17,701.59 |
| | Total p.a. | | $212,419.08 |

KENNETH L. RAY, Lt Col, USAF
Chief, Operations Division

TELETEACH EXPANDED DELIVERY SYSTEM

FY 80

SYSTEM COST BENEFITS

1. All system use is reported in this section. Two courses, SYS 227 and QMT 185 were not part of the evaluation plan, therefore, learning and acceptance data were not acquired.

2. Cost avoidance is presented rather than cost savings because the Teleteach Expanded Delivery (TEDS) was not implemented as a cost savings system. Its purpose is to enable AFIT to fulfill unmet educational requirements. Using the TEDS, course backlogs are reduced without incurring TDY costs associated with resident instruction. Hence financial figures are considered cost avoidance, not cost savings.

Cost data were compliled using these formulae:

a. Travel = Round trip Commercial air fare + Land fare expenses of $25.

b. Per diem = Daily rate for WPAFB ($24) X (class days + weekend days + one travel day.)

NOTE: Per diem total days were determined based upon the number of days which would have been necessary to conduct the same length course in residence at WPAFB.

3. Cost figures reflect the expense which would have been incurred if the remote students reached by Teleteach had come to WPAFB for resident instruction.

a. Only students reached by the School of Systems and Logistics are included in the analysis. Although students reached by the School of Engineering would not have received instruction without TEDS, they were not considered as course backlog and, consequently, would not have been brought to WPAFB for resident instruction.

b. AFLC and AFSC cost related data are also shown.

c. Individual course cost related data are presented as attachments.

1. SYS 123
2. SYS 223
3. SYS 227
4. LOG 220
5. QMT 170
6. QMT 185

## Cost Avoidance

| | AFIT | |
|---|---|---|
| Course [1] | Travel | Per Diem |
| SYS 123 | $50,576 | $54,744 |
| SYS 223 | 30,810 | 72,192 |
| SYS 227 | 13,384 | 14,760 |
| LOG 220 | 74,816 | 123,004 |
| QMT 170 | 34,980 | 46,512 |
| QMT 185 | 6,244 | 1,680 |
| Total | $210,810 | $312,892 |
| Total Cost Avoidance | | $523,702 |

| AFLC and AFSC | |
|---|---|
| Hours Used | 236 |
| People Involved | 1088 |
| Cost Benefit [2] | $272,127 |

1 Individual course computations are attached.

2 Includes: Cost savings $27,634 attributed to avoidance of budgeted TDY/Per diem.
Cost Avoidance $194,421 attributed to additional people served.
Productivity Gain $50,072 attributed to time saved due to avoidance of travel.



Note: Individual course cost figures are provided in Atch 6.

TELETEACH EXPANDED DELIVERY SYSTEM

FY 80

INDIVIDUAL COURSE DESCRIPTIONS

AND

ASSOCIATED COST FACTORS

Course
SYS 123
Fundamentals of Acquisition Management

Description: This course provides an overview of the management process by which USAF systems are acquired and in particular the role and responsibilities of the program office as they relate to the acquisition process. Students receive instruction involving the Air Force Systems Command, the acquisition process, the budget process, the program office, engineering management process, the contracting process, integrated logistics support, program control, the management review process, and the interrelations with other Air Force Commands.

Hours of Instruction: October-November = 80, January-February = 60.

Certificate Awarded: AFIT

Credit Awarded: None

Dates Provided: 10 October-7 November 1979 and 7 January-25 January 1980.

Students

| Site | Oct-Nov | Jan | Total | |
|---|---|---|---|---|
| WPAFB | 24 | 24 | 48 | |
| SD | 22 | 23 | 45 | Resident 48 |
| AD | 22 | 9 | 31 | Remote 147 |
| ESD | 27 | 26 | 53 | |
| HQ AFSC | 3 | 15 | 18 | |
| | 98 | 97 | 195 | |

Travel Costs Avoided

| Site | Air Fare | + | Ground Fare | X | Students | = | Total |
|---|---|---|---|---|---|---|---|
| SD | $513 | | $25 | | 45 | | $24,210 |
| AD | 291 | | 25 | | 31 | | 9,796 |
| ESD | 217 | | 25 | | 53 | | 12,826 |
| HQ | 183 | | 25 | | 18 | | 3,744 |
| | | | | | | | $50,576 |

SYS 123 Cont'd

Per Diem Costs Avoided

Rate $24 per day

TDY days if at WPAFB/AFIT: 80 hour (October-November) = 18
60 hour (January-February) = 13

| | #TDY Days | X | Per day rate | X | Students | = Total |
|---|---|---|---|---|---|---|
| October-November | 18 | | $24 | | 74 | $31,968 |
| January-February | 13 | | 24 | | 73 | 22,776 |
| | | | | | Total | $54,744 |

Total Cost Avoidance

| Travel | + | Per diem | = | Total |
|---|---|---|---|---|
| $50,576 | | $54,744 | | $105,320 |

Course
SYS 223
System Program Management

Description: This course is oriented toward further developing and enhancing the professional management "know how" and competence of Air Force Systems Command personnel in program management who are destined for future assignment as program managers or to other key positions in the PO. The course examines the pertinent Department of Defense, USAF and Air Force Systems Command policies and procedures affecting system acquisition management, and the organizational elements involved in implementing them. The phases of the acquisition life cycle of a system are fully developed and discussed. Also addressed are the many disciplines and functional areas of a PO. Current concepts and problem areas evident in the acquisition process are explored during the course.

Hours of Instruction: 136

Certificate Awarded: AFIT

Credit Awarded: 5, Upper Undergraduate

Dates Provided: 21 April-6 June 1980 and 23 June-8 August 1980

Students

| Site | April-June | June-August | Total | |
|---|---|---|---|---|
| WPAFB | 23 | 21 | 44 | Resident 44 |
| SD | 15 | 6 | 21 | Remote 94 |
| AD | 16 | 14 | 30 | |
| ESD | 19 | 13 | 32 | |
| HQ AFSC | 5 | 6 | 11 | |
| | 78 | 60 | 138 | |

Travel Costs Avoided

| Site | Air Fare | + | Ground Fare | X | Students | = | Total |
|---|---|---|---|---|---|---|---|
| SD | $513 | | $25 | | 21 | | $11,298 |
| AD | 291 | | 25 | | 30 | | 9,480 |
| ESD | 217 | | 25 | | 32 | | 7,744 |
| HQ | 183 | | 25 | | 11 | | 2,286 |
| | | | | | | | $30,810 |

SYS 223 Cont'd

Per Diem Costs Avoided

Rate $24 per day

TDY days if at WPAFB/AFIT: 32

| #TDY Days | X | Per day rate | X | Students | = Total |
|---|---|---|---|---|---|
| 32 | | $24 | | 94 | $72,192 |

Total Cost Avoidance

| Travel | + | Per diem | = | Total |
|---|---|---|---|---|
| $30,810 | | $72,192 | | $103,002 |

Course

LOG 220

MATERIELS MANAGEMENT

Description: This course is designed to improve the management effectiveness of key personnel assigned to Materiel Management and related AFLC activities which provide support to the Air Force and other DOD agencies. It is intended to familiarize the student with the structure, philosophy, policies, functions, processes and systems of Air Force Logistics, with particular reference to their impact on Materiel Management.

Hours of Instruction: 95

Certificate Awarded: AFIT

Credit Awarded: 4, Upper Undergraduate

Dates Provided: 10 October-16 November 1979 and 16 April-22 May 1980

Students

| Site | October/November | March-April | Total | |
|---|---|---|---|---|
| WPAFB | 24 | 24 | 48 | |
| OO | 22 | 22 | 44 | Resident 48 |
| OC | 19 | 19 | 38 | Remote 220 |
| SM | 24 | 24 | 48 | |
| SA | 22 | 22 | 44 | |
| WR | 23 | 23 | 46 | |
| | 134 | 134 | 268 | |

Travel Costs Avoided

| Site | Air Fare | + | Ground Fare | X | Students | = | Total |
|---|---|---|---|---|---|---|---|
| OO | $421 | | $25 | | 44 | | $19,624 |
| OC | 283 | | 25 | | 38 | | 11,704 |
| SM | 469 | | 25 | | 48 | | 23,712 |
| SA | 319 | | 25 | | 44 | | 15,136 |
| WR | 217 | | 25 | | 46 | | 11,132 |
| | | | | | | | $81,308 |

LOG 220 Cont'd

Per Diem Costs Avoided

Rate $24 per day

TDY days if at WPAFB/AFIT: 24

| #TDY Days | X | Per day rate | X | Students | = | Total |
|---|---|---|---|---|---|---|
| 24 | | $24 | | 220 | | $126,720 |

Faculty Expense*

| | Travel | + | Per Diem | = | Total |
|---|---|---|---|---|---|
| November | $4784 | | $1708 | | $6492 |
| May | 2741 | | 975 | | 3716 |
| | | | | Total | $10,208 |

Cost Avoidance

Student

| Travel | + | Per Diem | = | Total |
|---|---|---|---|---|
| $81,308 | | $126,720 | | $208,028 |

Faculty Expense

| | | |
|---|---|---|
| $ 6,492 | $ 3,716 | $ 10,208 |

Total Cost Avoidance

| | Student Cost Avoidance - Faculty Expense | = Total |
|---|---|---|
| November | Travel $81,308 -$6,492 | = $ 74,816 |
| May | Per diem $126,720 - $3,716 | 123,004 |
| | | $197,820 |

*Faculty travel to each site was required to conduct a simulation exercise.

Course
QMT 170
Principles of Contract Pricing

Description: This is the first and basic course in the DOD curriculum of courses in cost and price analysis. It provides the foundation for the study and practice of cost and price analysis. The course includes an examination of the environment in which cost and price analysis takes place, sources of data for cost and price analysis, tools and techniques available for cost and price analysis, methods of price analysis, methods for analyzing direct and indirect costs, performing profit analysis negotiation strategy and tactics, documentation of analysis and negotiation, and selected current pricing topics. A simulated negotiation of an actual cost analysis is used to illustrate and integrate the various concepts and methods taught in the course.

Hours of Instruction: 100

Certificate Awarded: DOD

Credit Awarded: 2, Lower Undergraduate

Dates Provided: 28 January-29 February 1980

Students

| Site | Total | |
|---|---|---|
| WPAFB | 22 | |
| OO | 18 | Resident 22 |
| SM | 19 | Remote 102 |
| SA | 19 | |
| WR | 22 | |
| ESD | 25 | |
| | 124 | |

Travel Costs Avoided

| Site | Air Fare | + | Ground Fare | X | Students | = | Total |
|---|---|---|---|---|---|---|---|
| OO | $421 | | $25 | | 18 | | $8,028 |
| SM | 469 | | 25 | | 19 | | 9,386 |
| SA | 319 | | 25 | | 18 | | 6,192 |
| WR | 217 | | 25 | | 22 | | 5,324 |
| ESD | 217 | | 25 | | 25 | | 6,050 |
| | | | | | | | $34,980 |

QMT 170 Cont'd

Per Diem Costs Avoided

Rate $24 per day

TDY days if at WPAFB/AFIT: 19

| #TDY Days | X | Per day rate | X | Students | = | Total |
|---|---|---|---|---|---|---|
| 19 | | $24 | | 102 | | $46,512 |

Total Cost Avoidance

| Travel | + | Per Diem | = | Total |
|---|---|---|---|---|
| $34,980 | | $46,512 | | $81,492 |

Course
SYS 227
Financial Management in Weapons System Acquisition

Description: The course is designed for Air Force military and civilian personnel whose duties involve financial management in direct support of system acquisition programs. The general course structure relates the classical acquisition management functions to the specific activities of financial management. In addition to the coverage of the many financial tasks inherent to the weapon system acquisition process, the course also addresses related acquisition management topics and functional disciplines to more fully develop the total systems concept as a solid foundation on which to build the specific financial structure.

Hours of Instruction: 48

Certificate Awarded: AFIT

Credit Awarded: 4, Upper Undergraduate

Dates Provided: 18 August-5 September 1980

Students

| Site | Total | | |
|---|---|---|---|
| WPAFB | 19 | | |
| SD | 10 | Resident | 19 |
| AD | 10 | Remote | 41 |
| ESD | 14 | | |
| HQ | 7 | | |
| | 60 | | |

Travel Costs Avoided

| Site | Air Fare | + | Ground Fare | X | Students | = | Total |
|---|---|---|---|---|---|---|---|
| SD | $513 | | $25 | | 10 | | $5,380 |
| AD | 291 | | 25 | | 10 | | 3,160 |
| ESD | 217 | | 25 | | 14 | | 3,388 |
| HQ | 183 | | 25 | | 7 | | 1,456 |
| | | | | | | | $13,384 |

SYS 227 Cont'd

Per Diem Costs Avoided

Rate $24 per day

TDY days if at WPAFB/AFIT: 15

| #TDY Days | X | Per day rate | X | Students | = | Total |
|---|---|---|---|---|---|---|
| 15 | | $24 | | 41 | | $14,760 |

Total Cost Avoidance

| Travel | + | Per diem | = | Total |
|---|---|---|---|---|
| $13,384 | | $14,760 | = | $28,144 |

Course
QMT 185
COPPER IMPACT - APPLICATIONS

Description: This course provides the basic skills necessary for the experienced cost and price analyst to use the General Electric Mark III and COPPER IMPACT library of programs and cost models. The course enables the student to quickly acquire a wide variety of computer capabilities without actually being familiar with a computer language.

Hours of Instruction: 32

Certificate Awarded: AFIT

Credit Awarded: None

Dates Provided: 9 June-18 June 1980

Students

| Site | Total | |
|---|---|---|
| 00 | 14 | Resident 0<br>Remote 14 |

Travel Costs Avoided

| Site | Air Fare | + | Ground Fare | X | Students | = | Total |
|---|---|---|---|---|---|---|---|
| 00 | $412 | | $25 | | 14 | | $6,244 |

Per Diem Costs Avoided

Rate $24 per day

TDY days if at WPAFB/AFIT: 5

| #TDY days | X | Per Diem Rate | X | Students | = | Total |
|---|---|---|---|---|---|---|
| 5 | | $24 | | 14 | | $1,680 |

Total Cost Avoidance

| Travel | + | Per Diem | = | Total |
|---|---|---|---|---|
| $6,244 | | $1,680 | | $7,924 |

TELETEACH EXPANDED DELIVERY SYSTEM

COST ANALYSIS

SUMMARY

FY 79 - 80

| ITEM | | SOURCE |
|---|---|---|
| SYSTEM COST (FY 79 and FY 80) | $272,421 | Atch 4 |
| COST AVOIDANCE AFIT | $523,702 | Atch 5 |
| COST BENEFIT AFLC/AFSC | $272,127 | Atch 5 |

TOTAL COST BENEFIT

| AFIT COST AVOIDANCE | + | AFLC/AFSC COST BENEFIT | - | SYSTEM COST | = | COST BENEFIT |
|---|---|---|---|---|---|---|
| $523,702 | + | $272,127 | - | $272,421 | = | $523,408 |



atch 7

TELETEACH EXPANDED DELIVERY SYSTEM

FY 80

SYSTEM USE, STUDENTS INVOLVED, COURSE CERTIFICATION

AND

SITE PARTICIPATION



atch

Specific information concerning the courses presented through the Teleteach Expanded Delivery System in FY 80 is presented in this attachment. Each course is identified, its length (in hours) is shown, the number of times it was offerred, the students enrolled at each site, and the credit or certificate awarded, if any, are shown. The hours each TEDS site participated in the AFIT program is also provided.

The School of Systems and Logistics (LS) courses offer completion certificates and in most cases, academic credit. Credit is awarded at different levels. The abbreviations used in this attachment refer to the level of credit given, i.e. UUL is Undergraduate, Upper Level (Jr/Sr College) while ULL is Undergraduate, Lower Level (Fr/So College).

The School of Engineering courses do not provide certificates or credit.

## TELETEACH EXPANDED DELIVERY SYSTEM

| | Course | Hrs Length | Times Presented | Students WP | OO | OC | SM | SA | WR | SD | AD | ESD | HQ | Total Students | Credit | Certificate |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LS | LOG 220 | 95 | 2 | 48 | 44 | 38 | 48 | 44 | 46 | - | - | - | - | 268 | UUL4 | AFIT |
| | QMT 170 | 100 | 1 | 22 | 18 | - | 19 | 18 | 22 | - | - | 25 | - | 124 | ULL2 | DOD |
| | QMT 185 | 32 | 1 | 0 | 14 | - | - | - | - | - | - | - | - | 14 | None | AFIT |
| | SYS 123 | 70 | 2 | 48 | - | - | - | - | - | 45 | 31 | 53 | 18 | 195 | None | AFIT |
| | SYS 223 | 136 | 2 | 44 | - | - | - | - | - | 21 | 30 | 32 | 11 | 138 | UULS | AFIT |
| | SYS 227 | 48 | 1 | 19 | - | - | - | - | - | 10 | 10 | 14 | 7 | 60 | UUL4 | AFIT |
| EN | .Electro Optics | 3 | 2 | 54 | | | | | | 6 | 27 | 16 | 27 | 130 | None | None |
| | .Lasers | 2 | 2 | 46 | | | | | | 8 | 52 | 22 | 21 | 149 | None | None |
| | .Charg Part Beam | 2 | 2 | 42 | | | | | | 3 | 40 | 28 | 14 | 127 | None | None |
| | .Robust Stat | 6 | 1 | 8 | | | | | | - | 2 | 7 | - | 17 | None | None |
| | .Alter Normal | 1 | 1 | 10 | | | | | | - | 1 | 8 | - | 19 | None | None |
| | .Public Key | 1 1/2 | 1 | 4 | | | | | | - | 4 | 3 | - | 11 | None | None |
| | .Best Number | 1 1/2 | 1 | 7 | | | | | | - | - | 4 | - | 11 | None | None |
| | .Auto Algebra | 1 1/4 | 1 | 4 | | | | | | - | 1 | 2 | - | 7 | None | None |
| | .Funda Laser Optics | 7 1/2 | 2 | 18 | | | | | | - | 12 | 9 | 3 | 42 | None | None |
| | .Intro Commo | 3 | 2 | 8 | | | | | | - | 8 | 23 | - | 39 | None | None |
| | .Electro Optics, Over | 10 | 1 | 5 | | | | | | - | 8 | 4 | - | 17 | None | None |
| | .App Microphone | 4 | 3 | 55 | | | | | | 16 | 53 | 66 | 23 | 213 | None | None |
| | | | | 442 | 76 | 38 | 67 | 62 | 68 | 109 | 279 | 316 | 124 | 1581 | | |

Students

Total Resident 442 — Total Remote 1139

Total LS 181 — Total LS 618

Total EN 261 — Total EN 521

## SITE PARTICIPATION

The hours each site participated in AFIT instruction between 10 Oct 79 and 31 Aug 80 are shown below:

| | LS Courses | EN Courses | Total |
|---|---|---|---|
| Room 200, AFIT (WPAFB) | 320 | 0 | 320 |
| Ogden (Hill AFB) | 320 | 0 | 320 |
| Oklahoma City (Tinker AFB) | 188 | 0 | 188 |
| Sacramento (McClellan AFB) | 288 | 0 | 288 |
| San Antonio (Kelly AFB) | 288 | 0 | 288 |
| Warner Robins (Robins AFB) | 288 | 0 | 288 |
| Room 112, AFIT (WPAFB) | 412 | 68 1/2 | 480 1/2 |
| Space Division (Los Angeles AFS) | 412 | 26 | 438 |
| Armament Division (Eglin AFB) | 412 | 67 | 479 |
| Electronic Systems Division (Hanscom AFB) | 512 | 68 1/2 | 580 1/2 |
| Headquarters AFSC (Andrews AFB) | 412 | 41 | 453 |

STUDENT ACCEPTANCE

OF

SCHEDULE

BY SITE/TIME ZONE

| Site | n | Time Zone | Raw Scores A | N | R | % Score A | N | R |
|---|---|---|---|---|---|---|---|---|
| WP | 192 | ES | 90 | 23 | 79 | 47 | 12 | 41 |
| WR | 68 | ES | 23 | 10 | 35 | 34 | 15 | 51 |
| ESD | 106 | ES | 34 | 19 | 53 | 32 | 18 | 50 |
| HQS | 23 | ES | 11 | 2 | 10 | 48 | 9 | 43 |
| OC | 41 | CS | 20 | 6 | 15 | 49 | 15 | 37 |
| SA | 66 | CS | 16 | 10 | 40 | 24 | 15 | 61 |
| AD | 43 | CS | 10 | 1 | 32 | 23 | 2 | 74 |
| OO | 63 | M | 17 | 14 | 32 | 27 | 22 | 51 |
| SM | 64 | PS | 30 | 5 | 29 | 47 | 8 | 45 |
| SD | 52 | PS | 14 | 6 | 32 | 27 | 12 | 62 |

Total by Time Zone %

| | A | N | R |
|---|---|---|---|
| ES | 41 | 14 | 46 |
| | n=389 | | |
| CS | 31 | 11 | 58 |
| | n=150 | | |
| M | 27 | 22 | 51 |
| | n=63 | | |
| PS | 38 | 9 | 53 |
| | n=116 | | |

ES = Eastern Standard 1200-1600
CS = Central Standard 1100-1500
M = Mountain Standard 1000-1400
PS = Pacific Standard 0900-1300

Normal Class Hours

OVERALL %

| A | N | R |
|---|---|---|
| 32 | 12 | 47 |

n=718

TELETEACH EXPANDED DELIVERY SYSTEM

VISITATION SUMMARY

FY 80

| n = 29 | FAVORABLE | UNFAVORABLE |
|---|---|---|
| RAW SCORE | 24 | 5 |
| PERCENTAGE | 83 | 17 |



atch

TELETEACH EXPANDED DELIVERY SYSTEM

INTERACTION SUMMARY

FY 80

| TYPE COURSE | # OFFERINGS | % TIME USED | |
|---|---|---|---|
| | | AUDIO | GRAPHIC |
| Informational | 6 | 3-15 | 3-6 |
| Analytical | 1 | 9 | 36 |

AU-AFIT/ED-TR-81-4

# TELETEACH EXPANDED DELIVERY SYSTEM

# EVALUATION

15 DECEMBER 1981

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Major Alvin L. Milam, Ph.D

Air Force Institute of Technology
Directorate, Educational Plans and Operations
Plans and Evaluation Division
Wright-Patterson AFB, Ohio 45433

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PART I

# 1.0 BACKGROUND

## 1.1 Requirement

The rapid growth of knowledge and the increasing complexity of technology offer a significant challenge to educational institutions. This challenge is especially evident within the Air Force Institute of Technology (AFIT). AFIT is responsible for providing undergraduate, graduate, and professional continuing education to the Air Force, and in certain content areas, the Department of Defense (DOD). AFIT accomplishes its mission objectives through resident instruction at Wright-Patterson AFB and through various types of nonresident instruction.

Resident professional continuing education (PCE) is designed to foster intense concentration in a subject area while minimizing the time students are absent from their duty stations. Course length ranges from three days to six weeks. Instruction occurs during a 6-7 hour class day, five days a week. Many blocks of instruction are presented by experts who are not assigned to the AFIT faculty. They teach as guest lecturers in courses designed and managed by the permanent faculty.

Nonresident PCE is provided through seminars, workshops, on-site offerings at the students' location, and correspondence courses. Approximately 10,000 students are instructed annually in these modes. More requests for resident and nonresident education exist than AFIT can accommodate.

In the specific area of professional continuing education, neither manpower nor facilities have kept pace with the need. In the 1978-79 academic year alone, over 7,000 students received professional continuing education in resident courses - less than 45% of the 15,000 who needed resident PCE that year.

Meeting the education demand poses a difficult problem. How can AFIT provide education to more students in existing courses and concurrently develop new courses without increasing the number of faculty, resident facilities, or TDY cost?

This problem is particularly evident in the School of Systems and Logistics. Numerous courses have 2-3 year student backlogs, while numerous requests are pending for new courses. Faculty are restricted in the amount of time available for course development due to heavy commitments in providing instruction in existing courses.

Limited physical facilities both within AFIT and at WPAFB, limited faculty, and limited budget preclude a solution based upon increased resident student attendance. Expansion of current modes of nonresident instruction is also limited since an increase would require additional faculty, increased travel, and increased support personnel.

## 1.2 Telephonic Delivery Systems

During the search for a resolution of this problem, use of the telephone as an educational delivery system was considered. Research into the educational viability of telephonic instruction revealed that over 37 telephone networks now convey instruction to civilian students who are remote from the point of origin. The most common network patterns are within specific states or within limited geographical areas. The acknowledged leader, the University of Wisconsin, serves over 35,000 students annually through its statewide telephonic network.

Telephonic networks currently provide information and courses to medical, legal, and agricultural professionals as well as students in agronomy, business, engineering, and mathematics. As yet, there is no indication that any content discipline is unsuitable for telephonic transmission. Some programs offer academic credit, other meet PCE requirements, while others carry no formal credit. Program length varies with the majority adhering to the normal higher education schedule, i.e., one to two hours a day, one to two days per week.

Research has shown consistently that learning is not significantly affected when telephonic instruction is compared to traditional classroom instruction. An excellent review of the literature is provided in Myrless Hershey's dissertation, A Comparison of the Effectiveness of Telephone Network and Face-to-Face Instruction for the Course "Creative Classroom," Kansas State University, Manhattan, Kansas, 1977.

Since 1973, both the School of Civil Engineering and the School of Systems and Logistics have routinely used commercial dial-up telephone services to provide limited length (1-2 hours) instruction to single remote locations. Teleteach or Telelecture was the name given to this delivery mode.

Recent technological advances in telecommunications now offer expanded capabilities. In early 1979 American Telephone and Telegraph began commercial marketing of a device which can transmit, through telephone lines, material written upon an electronic blackboard and regenerate the writing at distant locations on a standard TV monitor. The electronic blackboard offers a significantly expanded capability for the use of the telephone for educational purposes.

The success of telephonic networks in the civilian sector and AFIT's previous limited use of the medium strongly suggested that a dedicated telephonic delivery system using the electronic blackboard might offer the solution to our need to educate more people without an increase in faculty, student facilities, or TDY funds.

The additional capabilities available in this Teleteach approach--the electronic blackboard, dedicated lines, and recording of classroom sessions, combined with AFIT's previous Teleteach/Telelecture delivery mode--suggested naming this delivery system the Teleteach Expanded Delivery System (TEDS).

## 1.3 Teleteach Expanded Delivery System History

AFIT courses were identified within the School of Systems and Logistics where significant student backlogs existed. These courses are provided to meet the requirements of essentially two major Air Force commands, the Air Force Logistics Command (AFLC) and the Air Force Systems Command (AFSC). Additionally, the majority of potential students are stationed at a limited number of bases.

Following an AFIT proposal, both commands agreed to establish a telephonic network with classrooms at specified bases. A preliminary cost analysis indicated that the cost of the delivery system would be offset if approximately 360 students received instruction without incurring travel and per diem expenses. Additionally, TEDS could provide a means of reducing the student backlog since instruction provided at AFIT to a regular class of 24 students could be received by approximately 120 additional students at AFLC sites and 96 additional students at AFSC sites. This could be accomplished without additional faculty.

Installation of two dedicated telephonic networks began in August 1979. One network connects AFIT with five Air Logistics Centers (ALCs) and a second network links AFIT with four AFSC locations. A map depicting network sites is provided at Attachment 1. Sites are geographically dispersed throughout the United States and encompass all time zones. Using two separate networks, two courses can be offered simultaneously: One for the AFLC sites, and one for the AFSC sites. Each course originates from a separate classroom at AFIT. The originating classroom and each remote site classroom are connected through two pairs of dedicated telephone lines. One pair sends and receives verbal expressions, while the other pair transmits writing generated upon the electronic blackboard. Each site is able to transmit as well as receive. Therefore, presentations may originate from any site. Necessary visuals, in the 35mm slide format and/or in printed form are provided to each site. All verbal and blackboard written communication during each class is recorded on stereo-audio tape. Replay of classroom sessions is at the discretion of each remote site monitor.

Consideration of the time zone differences and normal student working hours resulted in an instructional schedule of daily four hour sessions from 1200 to 1600 EST. Presentations originating at AFIT were made before a student class at Wright-Patterson AFB, Ohio. Ten-minute class breaks occurred each hour.

Several differences which exist between the AFIT TEDS and the situations previously described in the civilian education sector require identification.

The AFIT schedule (four hours per day, five days per week) offered a special challenge since, as mentioned previously, most studies of the effectiveness of telephonic delivery systems have been based upon a 1-2 hour exposure, 1-2 days a week. Second, most research has been conducted within a course structure using a small proportion of guest speakers. Three of the AFIT courses selected for inclusion in the experiment used a large number of guest speakers. The fourth course used only AFIT resident faculty. Third, two different presentation formats were used. Three courses used essentially the lecture format with opportunities for student questions/discussions,

while the fourth course used the problem-solving format. Also, student group projects were components of two courses.

Other factors which may have significant influence upon the outcome of the experiment, but which are not thoroughly addressed in available research studies are the effects of mandatory student attendance, lack of experience with the delivery system, and the time of day students receive instruction. There was only a minimum concern for bias due to novelty of the new system because courses provided by TEDS were at least 60 hours in length.

Initial installation of communications equipment began in August 1979. Agreement was reached that an extensive evaluation would be conducted during the initial year of system operation. The School of Systems and Logistics (LS) identified four courses to be presented by TEDS which would be included in the evaluation. Each course selected had at least a two-year student backlog. A course completion certificate is available in each course and in three of the four courses, academic credit is also available. For purposes of clarity, these are referred to in the remainder of this report as certificated courses.

The School of Engineering also provided several mini-courses during a portion of the time when LS was not using TEDS. The engineering mini-courses ranged from one to ten hours in length and awarded no course completion certificate or credit.

During the 1980 fiscal year the system was implemented and a comprehensive evaluation was conducted. The results are reported in the AFIT Technical Report AU/AFIT/ED-TR-81-3. Results revealed no significant difference in learning when the TEDS was used, student acceptance was positive, and the cost benefit exceeded $500,000 during the first year of operation.

## 1.4 Current Evaluation

During the second year of system operation, Oct 80-Sep 81, the comprehensive evaluation was conducted including the same courses involved in FY 80. Minor changes were made in the student end-of-course critique data collection instruments, some TEDS sites improved their facilities, and overall management was improved. This report focuses upon the results of the evaluation conducted during the second year of operation.

### 1.4.1 Experimental Design

The following groups were compared: NonTEDS versus TEDS; NonTEDS versus Resident TEDS; Resident TEDS versus Remote TEDS; On Site versus TEDS; On Site versus Resident TEDS.

Each comparison group was analyzed by demographic factors, end-of-course critique items, exam performance, and, when applicable, student acceptance of TEDS. The on-site offering occurred at Bergstrom AFB, Texas.

### 1.4.2 Statistical Analysis

The demographic, end-of-course critique items, and content exam data were collected on standard computer answer sheets, cards were punched and these were then batch loaded into the computer. The Statistical Package for the Social Sciences (SPSS) was then used to generate the statistical analyses. A subprogram generated crosstabulation tables representing tests of statistical significance (chi square) for demographic data and end-of-course critique items. The computer printouts displayed the variables by site locations and by method of delivery. Another subprogram calculated and printed the sums, means, standard deviations and variances. The variables analyzed were pretest and post-test scores, achievement, and student acceptance of TEDS. These variables were compared by location and by method of delivery and a one-way analysis of variance was computed to determine statistical significance. To determine the influence of the variables of locations, demographics, and method of delivery upon pretest, post-test, achievement and acceptance, a regression analysis was generated. The significance level was set at .05.

### 1.4.3 Research Questions

These six research questions were examined in the evaluation:

1. Are student groups (control/experimental) comparable in terms of education level, grade/rank, age, years of experience in the course content discipline, and entry level knowledge?

2. What effect upon academic achievement did the TEDS have compared to resident (nonTEDS) and on-site delivery of the same courses?

3. What differences in academic achievement occurred between resident student groups receiving instruction face-to-face with the presenter and student groups receiving instruction without face-to-face presentations when both groups used the TEDS?

4. To what extent was the TEDS acceptable to students?

5. To what extent did students consider the TEDS schedule acceptable?

6. How does the cost for TEDS compare to resident instruction (nonTEDS) on a per capita student basis?

## PART II

2.0

### 2.1 Demographic and Pretest Factors

The first research question concerns the comparability of the groups in terms of demographics and pretest performance. Twelve comparisons were made for each factor with these results:

| | NSD | SD |
|---|---|---|
| Education Level | 10 | 2 |
| Grade/Rank | 11 | 1 |
| Age | 10 | 2 |
| Years Experience | 10 | 2 |
| Pretest | 10 | 2 |

NSD = No significant difference
SD = Significant difference

### 2.2 Academic Achievement

The second and third research questions concern academic achievement (post-test scores minus pretest scores equals achievement). Analysis of the data indicated that six of the twelve comparison groups were from the same population according to demographic and pretest data and could be compared on achievement.

Of these six, three comparison groups showed no statistically significant differences in achievement between students who did or did not use TEDS. For the three remaining groups where significant differences did occur, one difference was in favor of TEDS and two differences were in favor of face-to-face resident TEDS instruction, when compared to remote TEDS students.

### 2.3 System Acceptance

Analysis of system acceptance data indicated that students approved of the Teleteach Expanded Delivery System.

The TEDS schedule was acceptable to students in both the Eastern and Pacific time zones but was unacceptable in the Central and Mountain time zones.

### 2.4 Cost

Costs for the Teleteach Expanded Delivery System were $224,718 for annual communication lease from 1 Oct 80-30 Sep 81.

### 2.5 Benefit

Computation of the benefit of the system in cost related terms was accomplished by determining the expenditures which would have been necessary had the 692 remote students reached by TEDS been brought to WPAFB for resident instruction. Travel and per diem costs were included in this

category. The total was found to be $611,370 which includes a deduction for faculty travel/per diem to provide a simulation exercise in one course.

2.6 Cost/Benefit Relationship

Cost benefit was determined by subtracting system cost ($224,718) from cost avoidance ($611,370 + $83,781*). The cost benefit from 1 Oct 80-30 Sep 81 was $470,433. For AFIT alone, the cost benefit was $386,652.

TEDS student cost was $273.05. During the same time period the average per student cost for resident instruction was $944.50.

*Note: In addition to system use for AFIT courses, both AFLC and AFSC used TEDS to conduct conferences, briefings, and short training sessions. Data acquired from these users revealed a cost avoidance of $83,781.

## PART III

## SUMMARY

3.0

### 3.1 Conclusions

This study indicates that TEDS students achieve at least as well as students taught in residence at WPAFB for those courses included in the study. Students accept TEDS as a delivery method. Acceptance of the TEDS schedule depends upon the time zone when instruction is received. TEDS is a cost effective educational delivery system which provides education to over three (3.46) students at the cost of one resident student.

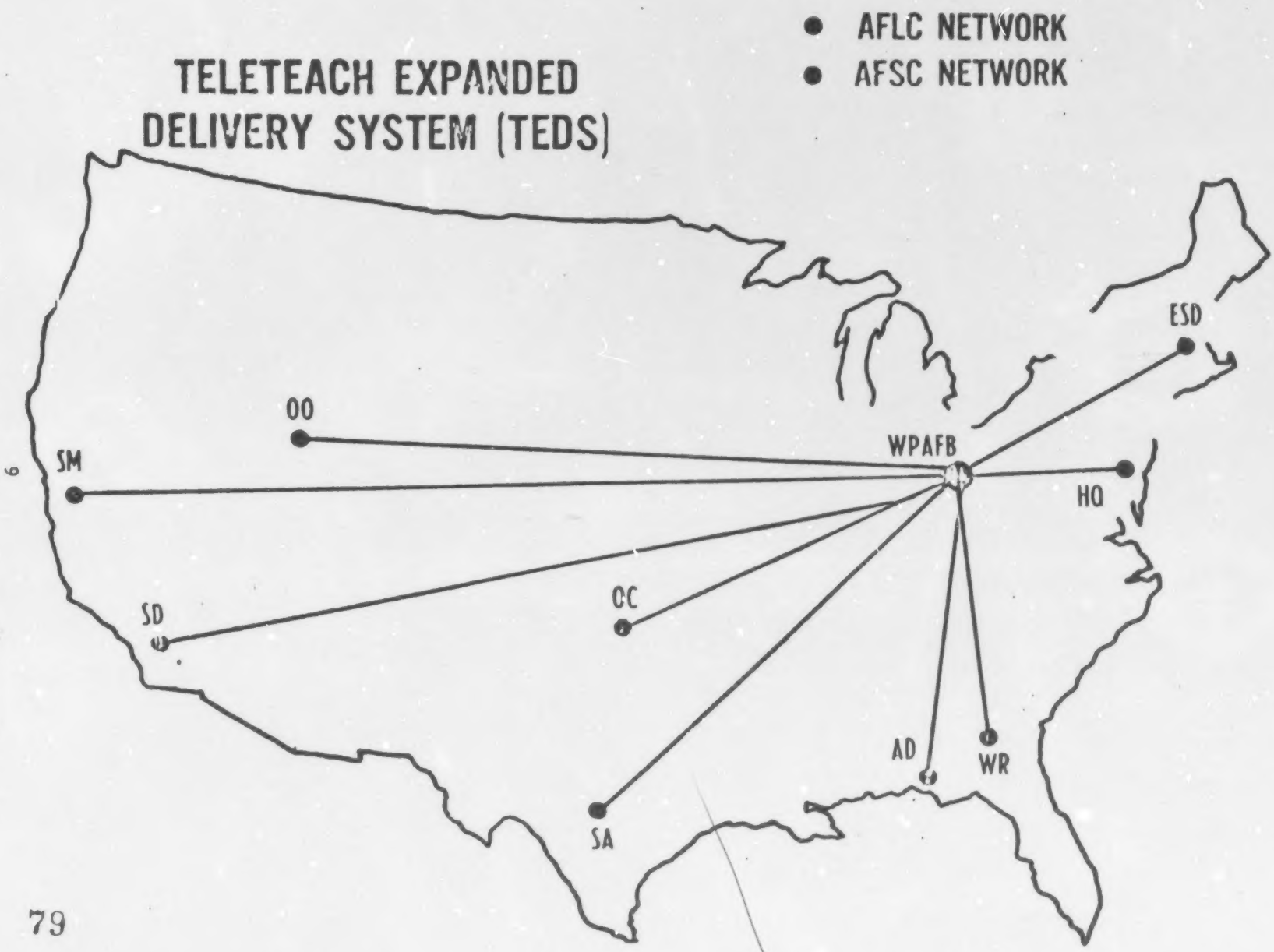
### 3.2 Recommendations

1. Identify other courses/applications which could use the system.

2. Continue evaluating TEDS' effect upon learning, acceptance, and cost.

3. Experiment with schedule variations.

# TELETEACH EXPANDED DELIVERY SYSTEM (TEDS)



APPENDIX A

TELETEACH EXPANDED DELIVERY SYSTEM

FY 81

ACHIEVEMENT SCORES

| METHODOLOGY | ACHIEVEMENT (SAME POPULATION) | |
|---|---|---|
| | NO SIGNIFICANT DIFFERENCE | SIGNIFICANT DIFFERENCE |
| NONTEDS vs TEDS | 2 | 1 (TEDS) |
| NONTEDS vs RESIDENT TEDS | 1 | 0 |
| RESIDENT TEDS vs REMOTE TEDS | 0 | 2 (Resident) |

*p = .05

INCLUDES RESULTS FROM 4 TEDS COURSES

COURSES

LOG 220

SYS 123

SYS 223

QMT 170

| METHODOLOGY | ACHIEVEMENT (ALL COMPARISONS) | |
|---|---|---|
| | NO SIGNIFICANT* DIFFERENCE | SIGNIFICANT DIFFERENCE |
| NONTEDS vs TEDS | 2 | 1 (T) |
| NONTEDS vs RESIDENT TEDS | 2 | 1 (T) |
| RESIDENT TEDS vs REMOTE TEDS | 1 | 3 |
| ON SITE vs TEDS | 0 | 1 (OS) |
| ON SITE vs RESIDENT TEDS | 0 | 1 (OS) |

*p = .05

INCLUDES RESULTS FROM 4 TEDS USES

COURSES

LOG 220 (1 TEDS Offering, 1 Resident Offering)

SYS 123 (1 TEDS Offering)

QMT 170 (1 TEDS Offering, 1 Resident Offering and 1 On Site Offering

SYS 223 (1 TEDS Offering, 1 Resident Offering)

## ACHIEVEMENT BY SITE/COURSE

ACHIEVEMENT IS POST TEST MEAN SCORE MINUS PRETEST MEAN SCORE EXPRESSED IN PERCENTAGE

| Site | LOG220BR | LOG220CT | QMT170CR | QMT170BT | QMT170DS | SYS123BT | SYS223BR | SYS223AT |
|---|---|---|---|---|---|---|---|---|
| n | 30 | 132 | 26 | 151 | 22 | 59 | 73 | 69 |
| WP | 20.9 | 24.6 | 58.9 | 53.7 | | 48.1 | 39.2 | 46 |
| OO | | 20.6 | | 65 | | | | |
| OC | | 7.1 | | 69 | | | | |
| SA | | 14.9 | | 61.6 | | | | |
| SM | | 18.4 | | 67.5 | | | | |
| WR | | 18.9 | | 63.2 | | | | |
| SD | | | | 54.1 | | 51.6 | | 44.3 |
| AD | | | | 61.3 | | | | 36.1 |
| ESD | | | | 61.9 | | 30.4 | | 43.3 |
| HQ AFSC | | | | 54 | | 43.8 | | 42.2 |
| On Site | | | | | 67.4 | | | |

Key

n = Number of students
R = Resident offering
T = Teleteach offering
S = On Site offering

LOG 220

NonTEDS Resident

(81B)

| | Mean Pre % | % Gain Avail | Mean Post % | % Mean Gain | % Gain of Avail |
|---|---|---|---|---|---|
| WP | 58.4 | 41.6 | 79.3 | 20.9 | 50.2 |

TELETEACH

(81C)

| | | | | | |
|---|---|---|---|---|---|
| WP | 57.8 | 42.2 | 82.4 | 24.6 | 58.3 |
| OO | 57.1 | 42.9 | 77.7 | 20.6 | 48 |
| OC | 66.0 | 34 | 73.1 | 7.1 | 20.9 |
| SA | 64.9 | 35.1 | 79.8 | 14.9 | 42.4 |
| SM | 64.2 | 35.8 | 82.6 | 18.4 | 51.1 |
| WR | 63.5 | 36.5 | 82.4 | 18.9 | 51.8 |
| TOTAL AVERAGE | 62.2 | 37.7 | 80 | 17.4 | 45.4 |
| REMOTES ONLY | 63.1 | 36.9 | 79.1 | 16 | 42.8 |

QMT 170

NonTEDS RESIDENT

(81C)

| | Mean Pre % | % Gain Avail | Mean Post % | Mean % Gain | % Gain of Avail |
|---|---|---|---|---|---|
| WP | 24.1 | 75.9 | 83 | 58.9 | 77.6 |
| | | | On Site | | |
| | | | (81D) | | |
| Bergstrom | 15.7 | 84.3 | 83.1 | 67.4 | 80.0 |
| | | | TELETEACH | | |
| | | | (81B) | | |
| WP | 26.2 | 73.8 | 79.9 | 53.7 | 72.8 |
| OO | 19.8 | 80.2 | 82.6 | 62.8 | 78.3 |
| OC | 13.8 | 86.2 | 81.8 | 68 | 78.9 |
| SA | 19.9 | 80.1 | 81.5 | 61.6 | 76.9 |
| SM | 17.8 | 82.2 | 84.2 | 66.4 | 80.8 |
| WR | 21.0 | 79.0 | 83.4 | 62.4 | 79.0 |
| ESD | 21.1 | 78.9 | 80.1 | 59 | 74.8 |
| HQ AFSC | 39.0 | 61 | 93.0 | 54 | 88.5 |
| SD | 28.8 | 71.2 | 82.5 | 53.7 | 75.4 |
| AD | 27.4 | 72.6 | 88.7 | 61.3 | 84.4 |
| TOTAL AVERAGE | 23.5 | 76.5 | 83.8 | 60.3 | 79 |
| REMOTES ONLY | 23.2 | 76.8 | 84.2 | 61 | 79.7 |

SYS 123

TELETEACH

(81B)

| | Mean Pre % | % Gain Avail | Mean Post % | Mean % Gain | % Gain of Avail |
|---|---|---|---|---|---|
| WP | 21.1 | 78.9 | 69.2 | 48.1 | 60.9 |
| SD | 20.1 | 79.9 | 71.7 | 51.6 | 64.5 |
| ESD | 28.5 | 71.5 | 58.9 | 30.4 | 42.5 |
| HQ AFSC | 24.7 | 75.3 | 68.5 | 43.8 | 58.1 |
| TOTAL AVERAGE | 23.6 | 76.4 | 67.1 | 43.5 | 56.5 |
| REMOTE AVERAGE | 24.4 | 75.6 | 66.4 | 41.9 | 55.0 |

SYS 223

NonTEDS RESIDENT

(81B)

| | Mean Pre % | % Gain Avail | Mean Post % | Mean % Gain | % Gain of Avail |
|---|---|---|---|---|---|
| WP | 40.1 | 59.9 | 79.3 | 39.2 | 65.4 |

TELETEACH

(81A)

| | | | | | |
|---|---|---|---|---|---|
| WP | 36.9 | 63.1 | 82.9 | 46 | 72.9 |
| SD | 35.9 | 64.1 | 80.2 | 44.3 | 69.1 |
| AD | 38.4 | 61.6 | 74.5 | 36.1 | 58.6 |
| ESD | 36.4 | 63.6 | 79.7 | 43.3 | 68 |
| HQ AFSC | 42.5 | 57.5 | 84.7 | 42.2 | 73.4 |
| TOTAL AVERAGE | 38.02 | 61.98 | 80.4 | 42.38 | 68.4 |
| REMOTES ONLY | 38.3 | 61.7 | 79.77 | 41.47 | 67.27 |

ACHIEVEMENT BY SITE/COURSE

ACHIEVEMENT AS PERCENT GAIN OF AVAILABLE

| Site | LOG220BR | LOG220CT | QMT170CR | QMT170BT | QMT170DS | SYS123BT | SYS223BR | SYS223AT |
|---|---|---|---|---|---|---|---|---|
| WP | 50.2 | 58.3 | 77.6 | 72.8 | | 60.9 | 65.4 | 72.9 |
| OO | | 48 | | 78.3 | | | | |
| OC | | 20.9 | | 78.9 | | | | |
| SA | | 42.7 | | 76.9 | | | | |
| SM | | 51.1 | | 80.8 | | | | |
| WR | | 51.8 | | 79 | | | | |
| SD | | | | 75.4 | | 64.5 | | 69.1 |
| AD | | | | 84.4 | | | | 58.6 |
| ESD | | | | 74.8 | | 42.5 | | 68 |
| HQ AFSC | | | | 88.5 | | 58.1 | | 73.4 |
| On Site | | | | | 80 | | | |

TELETEACH EXPANDED DELIVERY SYSTEM

FY 81

ACCEPTANCE SCORES

Acceptance
Scales
By Course By Site
Teleteach
Only

| Site | LOG220 C | | QMT170 B | | SYS123 B | | SYS223 A | | Average | | Times Measured |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | % | Pts | % | Pts | % | Pts | % | Pts | % | Pts | |
| WP | 65 | 2.6 | 83.5 | 2.23 | 65 | 2.6 | 68.1 | 2.82 | 70.4 | 2.56 | 4 |
| OO | 56.8 | 2.77 | 32.1 | 4.0 | | | | | 44.4 | 3.38 | 2 |
| OC | 52.6 | 3.16 | 23.6 | 4.62 | | | | | 38.1 | 3.89 | 2 |
| SA | 95.6 | 1.96 | 53.3 | 3.07 | | | | | 74.4 | 2.51 | 2 |
| SM | 71.7 | 2.39 | 100 | 1.28 | | | | | 85.8 | 1.83 | 2 |
| WR | 64.4 | 2.9 | 17.6 | 4.53 | | | | | 41 | 3.71 | 2 |
| ESD | | | 50 | 3.37 | 5.7 | 5.37 | 10 | 5.05 | 21.9 | 4.59 | 3 |
| AD | | | 56.2 | 3.2 | | | 40.5 | 3.76 | 48.3 | 3.48 | 2 |
| SD | | | 42.8 | 3.93 | 65 | 3.1 | 58.3 | 3.25 | 55.4 | 3.43 | 3 |
| HQ AFSC | | | 100 | 2.0 | 40 | 3.8 | 62.5 | 2.87 | 67.5 | 2.89 | 3 |
| All Sites | 67.7 | 2.61 | 55.9 | 3.35 | 43.9 | 3.69 | 47.9 | 3.66 | 54.1 | 3.33 | 25 |
| Remotes Only | 68.2 | 2.61 | 52.8 | 3.56 | 36.9 | 4.39 | 42.8 | 3.97 | 52.9 | 3.63 | 21 |

Percentage scores are the product of combining responses to questions 23 and 25 on student end-of-course critique. Point scores are derived from a scale of zero to six. The lower the score, the higher the acceptance (3.5 midpoint).

TELETEACH EXPANDED DELIVERY SYSTEM

FY 81

ACCEPTANCE OF SCHEDULE SCORES

STUDENT ACCEPTANCE PERCENTAGES
OF
SCHEDULE
BY
SITE/TIME ZONE

| SITE | TIME ZONE | LOG220 | QMT170 | SYS123 | SYS223 | AVERAGE | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | SITE | TIME ZONE | % |
| WP | E | 66.7 | 34.8 | 61.9 | 54.5 | 54.47 | | |
| WR | E | 73.9 | 64.7 | | | 69.3 | E | 61.22 |
| ESD | E | - | 62.5 | 53.3 | 55 | 56.93 | | |
| HQ AFSC | E | - | 50 | 80 | 62.5 | 64.17 | | |
| OC | C | 42.1 | 22 | | | 32.05 | | |
| SA | C | 47.8 | 33.3 | | | 40.55 | C | 34.98 |
| AD | C | - | 40.9 | | 23.8 | 32.35 | | |
| OO | M | 45.5 | 40 | | | 42.75 | M | 42.75 |
| SM | P | 34.8 | 71.4 | | | 53.1 | P | 51.55 |
| SD | P | - | 50 | 50 | 50 | 50 | | |

Key E - Eastern Standard 1200-1600
C - Central Standard 1100-1500
M Mountain Standard 1000-1400
P Pacific Standard 0900-1300

TELETEACH EXPANDED DELIVERY SYSTEM

FY 81

INDIVIDUAL COURSE DESCRIPTIONS

AND

ASSOCIATED COST FACTORS

1. All system use is reported in this section.

2. Cost avoidance is presented rather than cost savings because the Teleteach Expanded Delivery (TEDS) was not implemented as a cost savings system. Its purpose is to enable AFIT to fulfill unmet educational requirements. Using the TEDS, course backlogs are reduced without incurring TDY costs associated with resident instruction. Hence financial figures are considered cost avoidance, not cost savings.

Cost data were compiled using these formulae:

a. Travel = Round trip commercial air fare + land fare expenses of $25.

b. Per diem = Daily rate for WPAFB ($27) x (class days + weekend days + one travel day.)

NOTE: Per diem total days were determined based upon the number of days which would have been necessary to conduct the same length course in residence at WPAFB.

3. Cost figures reflect the expense which would have been incurred if the remote students reached by Teleteach had come to WPAFB for resident instruction.

a. Only students reached by the School of Systems and Logistics are included in the analysis. Although students reached by the School of Engineering would not have received instruction without TEDS, they were not considered as course backlog and, consequently, would not have been brought to WPAFB for resident instruction.

b. AFLC and AFSC cost related data are also shown.

c. Individual course cost related data are presented in this order:

1. LOG220
2. QMT170
3. SYS123
4. SYS223

Course
LOG220
Materiels Management

Description: This course is designed to improve the management effectiveness of key personnel assigned to Materiel Management and related AFLC activities which provide support to the Air Force and other DOD agencies. It is intended to familiarize the student with the structure, philosophy, policies, functions, processes and systems of Air Force Logistics, with particular reference to their impact on Materiel Management.

Hours of Instruction: 108
Certificate Awarded: AFIT
Credit Awarded: 4, Upper Undergraduate
Dates Provided: 15 Oct-21 Nov; 1 Apr-7 May; 8 Jul-13 Aug 81

Students

| Site | Oct-Nov | Apr-May | Jul-Aug | Total | |
|---|---|---|---|---|---|
| WP | 22 | 23 | 23 | 68 | Resident 68 |
| OO | 21 | 22 | 18 | 61 | Remote 337 |
| OC | 24 | 19 | 22 | 65 | |
| SM | 22 | 25 | 24 | 71 | |
| SA | 23 | 23 | 22 | 68 | |
| WR | 28 | 23 | 21 | 72 | |
| Total | 140 | 135 | 130 | 405 | |

Travel Costs Avoided

| Site | Air Fare | + | Ground Fare | X | Students | = | Total |
|---|---|---|---|---|---|---|---|
| OO | $463 | | $25 | | 61 | | $29,768 |
| OC | 311 | | 25 | | 65 | = | 21,840 |
| SM | 515 | | 25 | | 71 | = | 38,340 |
| SA | 350 | | 25 | | 68 | = | 25,500 |
| WR | 238 | | 25 | | 72 | = | 18,936 |
| | | | | | | Total | $134,384 |

Per Diem Costs Avoided

Rate $27 per day
TDY days if at WPAFB/AFIT: 24

| # TDY Days | X | Per Diem Rate | X | Remote Students | = | Total |
|---|---|---|---|---|---|---|
| 24 | | $27 | | 337 | | $218,376 |

Faculty Expense

| Travel/Per Diem each offering | X | # offerings | = | Total |
|---|---|---|---|---|
| $2662 | | 3 | | $7986 |

Cost Avoidance
Student

| Travel | + | Per diem | Total | Minus Faculty Expense |
|---|---|---|---|---|
| $134,384 | | $218,376 | $352,760 | - $7986 |

Total Cost Avoidance $344,774

Course
QMT170
Principles of Contract Pricing

Description: This is the first and basic course in the DOD curriculum of courses in cost and price analysis. It provides the foundation for the study and practice of cost and price analysis. The course includes an examination of the environment in which cost and price analysis takes place, sources of data for cost and price analysis, tools and techniques available for cost and price analysis, methods of price analysis, methods for analyzing direct and indirect costs, performing profit analysis negotiation strategy and tactics, documentation of analysis and negotiation, and selected current pricing topics. A simulated negotiation of an actual cost analysis is used to illustrate and integrate the various concepts and methods taught in the course.

Hours of Instruction: 90
Certificate Awarded: DOD
Credit Awarded: 2, Lower Undergraduate
Dates Provided: 5 Jan-6 Feb 81; 1-19 Jun 81

Students

| Site | Jan-Feb | Jun | Total |
|---|---|---|---|
| WP | 25 | 32 | 57 |
| OO | 17 | - | 17 |
| OC | 10 | - | 10 |
| SM | 9 | - | 9 |
| SA | 15 | - | 15 |
| WR | 21 | - | 21 |
| SD | 20 | - | 20 |
| AD | 23 | 12 | 35 |
| ESD | 14 | - | 14 |
| HQ AFSC | 2 | - | 2 |
| Total | 156 | 44 | 200 |

Resident 57
Remote 143

Travel Costs Avoided

| Site | Air Fare | + | Ground Fare | X | Students | = | Total |
|---|---|---|---|---|---|---|---|
| OO | $463 | | $25 | | 17 | | $8,296 |
| OC | 311 | | 25 | | 10 | | 3,360 |
| SM | 515 | | 25 | | 9 | | 4,860 |
| SA | 350 | | 25 | | 15 | | 5,625 |
| WR | 238 | | 25 | | 21 | | 5,523 |
| SD | 564 | | 25 | | 20 | | 11,780 |
| AD | 320 | | 25 | | 35 | | 12,075 |
| ESD | 238 | | 25 | | 14 | | 3,682 |
| HQ AFSC | 201 | | 25 | | 2 | | 452 |
| | | | | | | Total | $55,653 |

## Per Diem Costs Avoided

Rate $27 per day
TDY if at WPAFB/AFIT: 19

| # TDY days | X Per Diem Rate | X Remote Students | = Total |
|---|---|---|---|
| 19 | $27 | 143 | $73,359 |

Total Cost Avoidance

| Travel | + | Per Diem | = | Total |
|---|---|---|---|---|
| $55,653 | | $73,359 | | $129,012 |

Course
SYS123
Fundamentals of Acquisition Management

Description: This course provides an overview of the management process by which USAF systems are acquired and in particular the role and responsibilities of the program office as they relate to the acquisition process. Students receive instruction involving the Air Force Systems Command, the acquisition process, the budget process, the program office, engineering management process, the contracting process, integrated logistics support, program control, the management review process, and the interrelations with other Air Force Commands.

Hours of Instruction: 60
Certificates Awarded: AFIT
Credit Awarded: None
Date Provided: 14 Oct-31 Oct 81 and 6 Nov-26 Nov 81

Students

| Site | Oct | Nov | Feb-Mar* | Total | | |
|---|---|---|---|---|---|---|
| WP | 24 | 21 | 1 | 46 | Resident | 46 |
| SD | 7 | 12 | 6 | 25 | Remote | 87 |
| AD | 4 | - | 6 | 10 | | |
| ESD | 17 | 15 | 2 | 34 | | |
| HQ AFSC | 14 | 4 | - | 18 | | |
| Total | 66 | 52 | 15 | 133 | | |

Travel Costs Avoided

| Site | Air Fare | + | Ground Fare | X | Students | = | Total |
|---|---|---|---|---|---|---|---|
| SD | $564 | | $25 | | 25 | | $14,725 |
| AD | 320 | | 25 | | 10 | | 3,450 |
| ESD | 238 | | 25 | | 34 | | 8,942 |
| HQ AFSC | 201 | | 25 | | 18 | | 4,068 |
| | | | | | | Total | $31,185 |

Per Diem Costs Avoided

Rate $27 per day
TDY days if at WPAFB/AFIT: 13

| | # TDY days | X Per Diem Rate | X Remote Students | = Total |
|---|---|---|---|---|
| Oct | 13 | $27 | 42 | $14,742 |
| Nov | 13 | 27 | 31 | 10,881 |
| Feb-Mar | 13 | 27 | 14 | 4,914 |
| | | | | $30,537 |

Total Cost Avoidance

| Travel | + | Per Diem | = | Total |
|---|---|---|---|---|
| $31,185 | | $30,537 | | $61,722 |

*Attended first part of SYS223.

Course
SYS223
System Program Management

Description: This course is oriented toward further developing and enhancing the professional management "know how" and competence of Air Force Systems Command personnel in program management who are destined for future assignment as program managers or to other key positions in the PO. The course examines the pertinent Department of Defense, USAF and Air Force Systems Command policies and procedures affecting system acquisition management, and the organizational elements involved in implementing them. The phases of the acquisition life cycle of a system are fully developed and discussed. Also addressed are the many disciplines and functional areas of a PO. Current concepts and problem areas evident in the acquisition process are explored during the course.

Hours of Instruction: 136
Certificate Awarded: AFIT
Credit Awarded: 5, Upper Undergraduate
Dates Provided: 9 Feb-27 Mar 81

Students

| Site | Feb-Mar |
|---|---|
| WP | 23 |
| SD | 15 |
| AD | 17 |
| ESD | 22 |
| HQ AFSC | 8 |
| Total | 85 |

| | |
|---|---|
| Resident | 23 |
| Remote | 62 |

Travel Costs Avoided

| Site | Air Fare | + | Ground Fare | X | Students | = | Total |
|---|---|---|---|---|---|---|---|
| SD | $564 | | $25 | | 15 | | $8,835 |
| AD | 320 | | 25 | | 17 | | 5,865 |
| ESD | 238 | | 25 | | 22 | | 5,786 |
| HQ AFSC | 201 | | 25 | | 8 | | 1,808 |
| | | | | | Total | | $22,294 |

Per Diem Costs Avoided

Rate $27 per day
TDY days if at WPAFB/AFIT: 32

| | # TDY Days | X | Per Diem Rate | X | Remote Students | = | Total |
|---|---|---|---|---|---|---|---|
| Feb-Mar | 32 | | $27 | | 62 | | $53,568 |

Total Cost Avoidance

| Travel | + | Per Diem | + | Total |
|---|---|---|---|---|
| $22,294 | | $53,568 | | $75,862 |

TELETEACH EXPANDED DELIVERY SYSTEM

FY 81

SYSTEM COST RELATIONSHIPS

## Cost Avoidance

| AFIT | | | | | AFLC and AFSC | |
|---|---|---|---|---|---|---|
| Course[1] | Travel | Per Diem | Students[3] Resident | Remote | | |
| LOG220 | $130,391 | $214,383 | 68 | 337 | Hours Used | 148 |
| QMT170 | 55,653 | 73,359 | 57 | 143 | People Involved | 673 |
| SYS123 | 31,185 | 30,537 | 46 | 87 | Cost Benefit[2] | $83,781 |
| SYS223 | 22,294 | 53,568 | 23 | 62 | | |
| Total | $239,523 | $371,847 | Total 194 | 629 | | |

| | |
|---|---|
| AFIT Cost Avoidance | $611,370 |
| AFLC/AFSC Cost Benefit | 83,781 |
| Total | $695,151 |

| | | |
|---|---|---|
| Cost Avoidance | Travel | $239,523 |
| | Per Diem | 371,847 |
| Total AFIT Cost Avoidance | | $611,370 |

1 Individual course computations are attached.

2 Includes: Cost savings $5,840 attributed to avoidance of budgeted TDY/Per diem.
Cost avoidance $60,205 attributed to additional people served.
Productivity gain $17,736 attributed to time saved due to avoidance of travel.

3 Cost factors computed only on remote students.

Realized Cost Benefit

FY 81

| | |
|---|---|
| Cost Avoidance | $ 695,151 |
| System Cost | - 224,718 |
| Total Cost Benefit Realized | $ 470,433 |

TELETEACH EXPANDED DELIVERY SYSTEM

FY 81

NONACCREDITED

SCHOOL OF ENGINEERING MINI-COURSES

The AFIT School of Engineering provided five different mini-courses via the Teleteach Expanded Delivery System in FY 81. These mini-courses ranged in length from 1 1/2 to 6 hours, awarded no credit nor certificate, and attendance was voluntary. There were 578 students involved, 490 of whom were remote from WPAFB.

| Mini-Courses Title | Date Presented | Length in Hours |
|---|---|---|
| Lasers | 27 Jan 81 | 3 |
| Electro Optics | 29 Jan 81 | 3 |
| Robust Statistical Inference | 2-4 Feb 81 | 6 |
| Charged Particle Beams | 5 Feb 81 | 2 1/2 |
| TSI Technology | 30 Apr 81 | 3 |

| | Students* |
|---|---|
| WP | 88 |
| Remote | 490 |
| Total | 578 |

*Note: No costs were computed since the courses were too short.